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VOL. XX. No. 1

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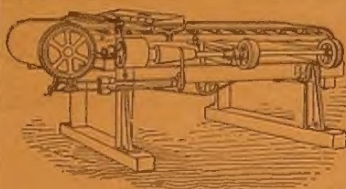
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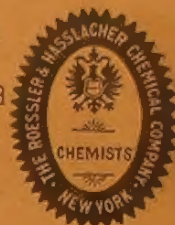
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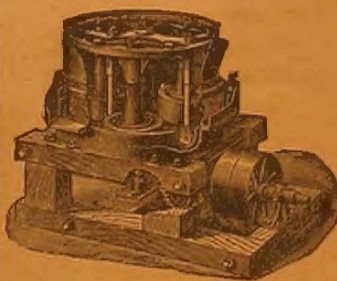
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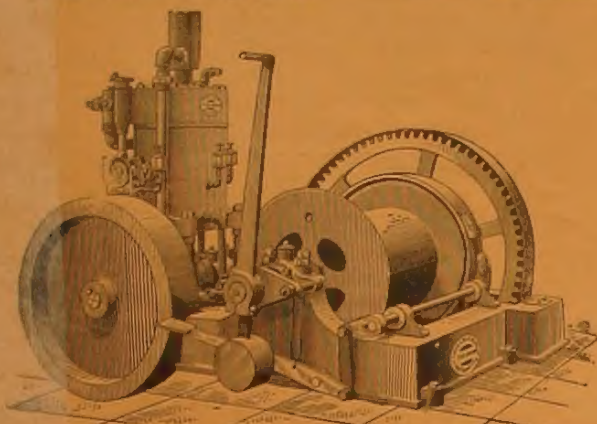
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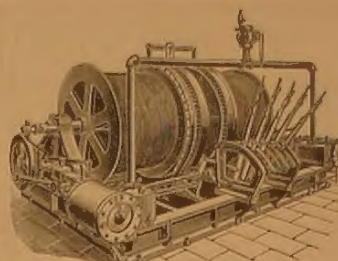
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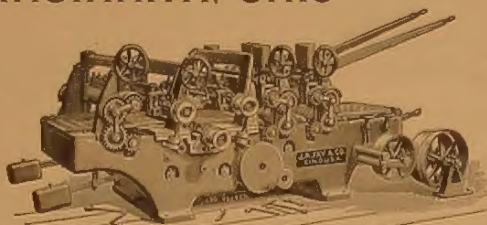
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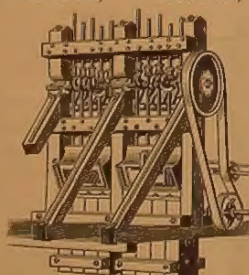
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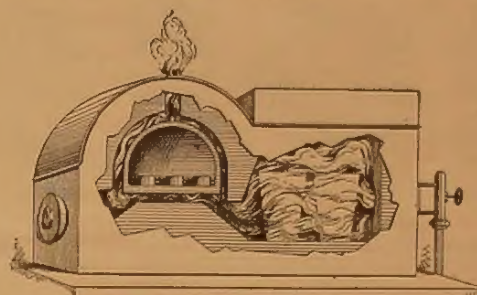
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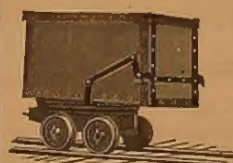
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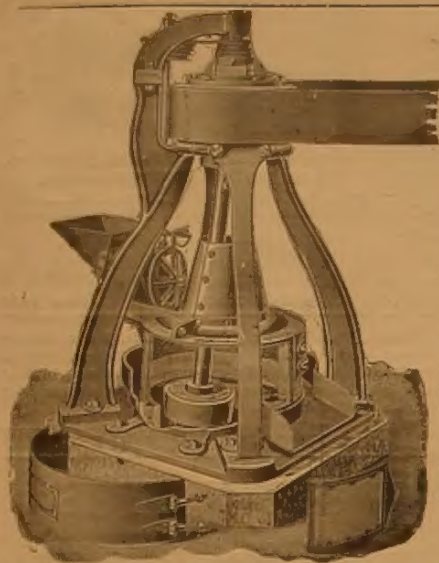
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At the jubilee meeting of the American Association for the Advancement of Science, held in Boston, Mass., August 22nd to 27th inclusive, among other papers presented to the section of Geology was one of western interest, which requires some remarks on account of the errors it contains, if the author has been correctly reported in the *Engineering and Mining Journal* of 3rd Sept., as follows:

"Mr. C. R. Orcutt, San Diego, presented a note, saying that near San Diego, Cal., there is an enormous vein of lepidolite (lithia mica) containing rubellite (pink tourmaline) in large amounts. The bed or vein is 60 feet or more in width, where best exposed, but its length was not stated. As a source of lithia and potash this deposit must soon take first rank commercially. It is now being worked as an open quarry and 1,500,000 tons estimated to be available. The deposit was discovered in 1889 and some large masses of it were displayed at the Columbian Exposition in 1893. About 20 tons of museum and cabinet specimens have been scattered over the world. Tourmalines of gem quality have not been found until this year, and they are all of the red variety, and are not to be considered rare at the locality."

The two mining claims on which the deposit referred to is located are about one mile north easterly from Pala church or mission on the San Luis Rey River, San Diego County, Cal., and not near San Diego as stated. They are owned by Mr. Nelson G. Douglass, Hotel Baltimore, Los Angeles, Cal. As the foundation of scientific knowledge is fact and truth, this slight correction is necessary.

The operation of mining, even when conducted most economically, is an expensive proceeding. It is therefore necessary that no loss of material mined should be permitted. The extent to which bi-products or concentrates are allowed to pass into the tailings at many small mines is a case in point. With the numerous excellent concentrating machines in the market, there is no excuse for such a wasteful manner of working. In some instances, it is true, the value per ton of tailings is small, but with concentration this value is increased so as to make it a paying operation to sack and ship the concentrates, or, without concentration, re-treat them by chlorination or cyanide process. In

mining, as in any other business, success often depends upon looking after the details or small losses incidental to operating machinery or process. Distance from railway line and freight rates have also a deterring effect in many instances, together with the comparatively small amount produced per day or month; but, by storing up that small amount at the mine or point of shipment, a carload would through time well repay all the trouble and expense involved.

This is a matter of economy which many small mine owners can well afford to put into practical use, and the year's profits in numerous instances will astonish them.

Bi-products may also consist of an ore or material different from that for which the mine is operated, and a market or use should be sought for this additional source of income.

In the early period of settlement of the United States and Canada, or of the eastern portion of these countries, the clearing of the forest for agricultural purposes by fire, and leaching the ashes produced and boiling down the liquid yielded large amounts of potash for export to Europe. The discovery of a mineral source of potash in the Strasfurth salt in Germany rendered the potash industry of America unprofitable, together with the increased settlement of the east and extended uses for hardwoods which were formerly destroyed. No mineral source of potash except lepidolite, orthoclase feldspar, etc., has been discovered, but not used, in the United States, although the districts which produce common salt, sodium chloride, may eventually yield potassium chloride, as in Germany, underneath the common or rock salt beds. At Secsen, in Brunswick, potash salts have been discovered at a depth of 2,190 feet. Of the bed 27 feet have been bored through, the cores yielded on analysis 24.14 per cent of potassium chloride. Those operating salt and borax works, in the southern and western states should endeavor to discover this valuable mineral. The increasing demand for potash as a fertilizer in the fruit-growing industry of the west furnishes a home market when discovered.

In the mining sections of the different states, the value of a collection of the minerals of the district in the care of a Chamber of Commerce or Board of Trade, and open to the public free of charge, is the best means of advertising this branch of the natural resources of the country. The first necessity is to have such a collection properly marked or labeled with the name of the mine or claim, and the owner's name and address, also giving the scientific or mineralogical name of the ore, as well as the common or trade name, together with the percentage of metal or analyses of the specimens exhibited, and stating its commercial value. Such an exhibit has an educational value, apart from the commercial interest it is sure to secure to the district which it is intended to represent. As a means of aiding the extension of new railway lines, it forms an object lesson of the mineral resources of the country next in value to that of actually visiting the locality represented. The success of some young ladies in trade results from the habit of placing the best goods in the shop window. The prospectors and miners in many sections of the country

can well afford to take a lesson from this example, and do a little honest advertising of their claims and mines through the medium of mineral exhibits of the natural products of their district. Such a display often meets the notice of a capitalist or mining engineer who knows the value of the mineral, or how to make its industrial operation possible, or where a market or capital can be obtained to purchase and operate it. It is the best aid to securing capital for the operation of new industries when properly managed and of advertising by sample the claim or mine which you own, or the ore which you desire to sell.

The history of industrial enterprise is that a period of mining activity is followed by the construction of new railway lines and branches to the existing railway systems, then comes the townsite and building boom in opening up the new territory. For over a year the mining industry has experienced a term of prosperity in all branches except silver mining. This expansion of the industry has been more in the form of steady development, devoid of any boom excitement, and, in consequence, the speculative feature has played but little or no part in the present activity. The day of extensive railway construction seems to be dawning over the vast undeveloped territory of the southwest. In Arizona the period of railway construction has already commenced in several counties of the territory. In California local capital has constructed the San Francisco and San Joaquin R. R. south to Bakersfield, and it is the intention to continue the line through Tejon Pass to Los Angeles. Two projected lines from Utah and southwestern Nevada to connect with lines to the now assured new harbor at San Pedro are also much-needed highways, to give an outlet to the large mineral territory through which they will pass. Utah and New Mexico promise to add several hundred miles of new railway lines to the existing systems. A continuance of the present mining activity is therefore sure to be increased and become a permanent factor in the trade of the west. Railway extension is pre-eminently the chief means of opening up new mining territory, by giving better facilities for bringing in supplies to the mining camps and in furnishing an outlet for the export of such ores and mineral products as require to be transported to market.

The war having come to an end, it has become apparent that there will speedily be a large surplus in the treasury. The revenue laws are very comprehensive, and are yielding a very much larger sum than will be necessary to meet current expenses. It is estimated that by the time Congress meets the surplus will not be less than \$300,000,000, and unless Congress makes larger appropriations than is expected, it is stated that the surplus will be used to extinguish the public debt.

When the war began, the general opinion was that it would be short, and events have proved its accuracy. A large number of Congressmen were of opinion that a bond issue was not necessary, and that treasury certificates should be issued to meet emergency expenses. This view is already demonstrated to have been the correct one. The bonds sold were \$200,000,000, and if the estimate of

surplus revenue on the 1st of December next should be found to be correct, there will be funds ample for the retirement of \$200,000,000 of certificates and leave a balance of \$100,000,000. The bonds issued are payable only after five years at the option of the government. Had certificates been issued instead of bonds, the payment of \$6,000,000 interest annually for a series of years would have been avoided.

To what class or classes of debts the surplus will be applied is a question that time only will make known. It is well understood that Secretary Gage holds that the greenbacks outstanding are a public debt, and that he is urgent for their retirement, consequently, it may be expected that he will ask Congress for authority to use the surplus for such purpose. Notwithstanding, it would relieve the people to take up interest-bearing obligations.

There will, doubtless, be strenuous opposition to retirement of the greenbacks, not only for the reason that they do not draw interest but it would reduce the money volume when there should be a large increase.

The annexation of Hawaii, the acquisition of Porto Rico, the immediate control and ultimate absorption of Cuba and probably the Philippines, will create an unusual demand for enlargement of the circulating volume. Besides, it is about time that a period of general industrial and commercial activity should commence. As the pendulum of the clock swings alternately from one extreme to the other, so it is in business affairs—briskness and depression follow each other with regularity.

The next is the short session of Congress, and it is not probable that there will be any legislation on the money question, certainly none of a comprehensive character, and repeal of taxes will hardly be attempted, hence, we may expect that revenues will continually flow in excess of expenditures until the long session of the next congress, which does not commence till the first Monday in December, 1899.

THE TECHNOLOGY OF CALIFORNIA BITUMENS.

[Concluded from last issue.]

It was beautifully colorless and brilliant, like the oils I had made thirty years before. Some of the best illuminating oil, made from eastern petroleum in the Los Angeles market was obtained, and the two oils were filled into two new lamps with carefully-trimmed wicks. They were made as nearly alike as possible, and the combustion was made as nearly as could be identical. The eastern oil burned to the last drop and left the lamp dry. The California oil burned well for a time, then the flame became yellow, the wick crusted, and at last the flame was extinguished with the oil only about half burned. It was sought in the above-described experiment to make as good an oil as could be made from California crude oil, without regard to cost. The result of the experiment was conclusive so far as Santa Paula oil was concerned; it afforded no encouragement whatever for the manufacture of illuminating oils from California crude, and confirmed the opinion that I had ventured years before and expressed, as above quoted.

I have in my possession a sample of the burning oil that I made from pressure distillate in 1867. It has become bright yellow in color, and a sediment of a deep orange color has gathered in the bottom of the bottle. The cork has been bleached for a long time, but the odor and density are unchanged. The

change of color went forward when, for a number of years, the bottle was packed in a box excluded from light. In his report upon petroleum to the United States census of 1890, the late Joseph D. Weeks stated that some of the wells near Newhall, Los Angeles County, furnished an oil that contained the paraffine series of hydrocarbons. Perhaps this opinion was based upon a report made by an unnamed chemist, whose results I was shown while in California, and who claimed to have isolated Warren's paraffine and isoparaffine groups, olefines and benzoles from the oils obtained by the Pacific Coast Company. I have myself obtained from these oils the esters of the nitrogenous basic oils, but the accidental loss of my specimen prevented me from investigating it further.

Soon after I reached California, in 1893, Dr. Salathé showed me what he claimed was crude paraffine from one of the wells of the Torrey canyon. He dissolved some of the material in naphtha, filtered the solution, and, evaporating the naphtha, obtained a white, wax-like solid. He claimed that this experiment proved the existence of paraffine in the Torrey canyon crude oil. I afterwards visited the Torrey canyon and was given a mass of a dark-brown, wax-like substance, which I was told was the other half of the mass given Dr. Salathé, and that the whole was taken from the sucker rods of one of the wells. I have since examined this material sufficiently to prove that it does not consist of any form of paraffine, but is an unsaturated hydrocarbon, readily combining with sulphuric and nitric acids. It is no doubt a solid olefine or naphthene.

A great variety of lubricating oils were made of various densities. As already stated, a reduced green oil was prepared and sold under the name of "skid oil." All of the lubricating oils prepared from green crude oil were superior to those obtained from brown oil, they in turn being superior to those obtained from black oil. The causes of these differences I have not been able to fully demonstrate, but am convinced that they are found in radical differences in the crude oils. The crude black oils, without regard to density, appear to undergo more rapid decomposition than the green or brown oils, and the crude heavy distillates from black oils also appear to be less stable. Immediately upon the discovery of the presence of the basic oils, I urged Dr. Salathé to remove them from the distillates and see what the effect would be upon the finished product. Accordingly, we washed 100 barrels of light lubricating distillate with 100 pounds of oil of vitriol, made into a 10 per cent solution. The result was the complete saturation of the acid, the solution becoming brown, and tasting bitter in place of sour. The solution acquired a strong odor of a cow stable, indicating the presence of hippuric acid, which is a benzole product. On drawing off this solution it was followed by a tarry mass, nearly solid, very adhesive, and possessing great tenacity. A second treatment with dilute acid gave a solution that was strongly acid. After thorough washing with water, the oil was treated with the ordinary 5 per cent of oil of vitriol, which was accompanied with a copious disengagement of sulphurous oxide gas and a quantity of "sludge acid" having the usual appearance. The oil was finally treated with air-slacked lime, and finished in the settling tanks. Some of the heaviest lubricating distillates were finished in the still as reduced oils, and other were diluted with naphtha and treated, furnishing highly-fin-

ished products of fine quality. On pushing our applications for patents through the Patent office, we found we were using processes already in use in the Scotch paraffine oil industry, although we were not aware of the similarity existing between both the materials and methods.*

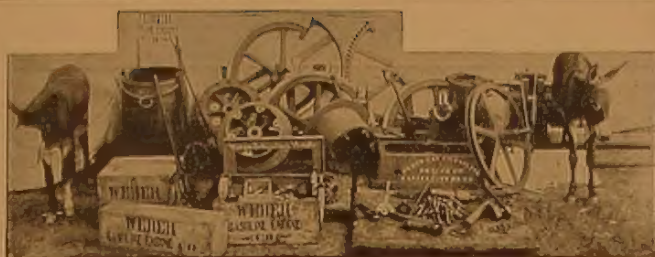
A number of barrels of the acid solution of the basic oils were introduced into an agitator and an equal quantity of naphtha added, and the acid neutralized with a strong solution of caustic soda. As the naphtha was steam distilled, we supposed we could separate it from the basic oil by steam, but in this we were in error. The oils held about one-third of their bulk of naphtha when treated in a still with a steam coil through which steam was held at a pressure of 100 pounds. The mixed solution of three parts of oil and one part naphtha was put into a still heated directly and distilled to coke. The first naphtha that came over contained pyridin, but the amount of basic oils continued to increase until the sixth 5 per cent was free from naphtha. These basic oils were all very heavy. They were at first of a brown color, then they became cherry red, and then brown again. The last that came over were heavier than water, through which they sank in drops like shot. A portion of the cherry-red oil of the proper density was found by Dr. Salathé to be nearly chinolin, which yielded some very fine purples and violets on silk. These oils readily dissolved in acid. From these acid solutions the hydrates of the basic oils were precipitated by caustic soda in cream-colored flakes. When these flakes were gathered on a filter they soon turned brown, and in time they completely evaporated at the ordinary temperature of the atmosphere.

The acid tar was soluble in alkaline solutions, from which it was again precipitated as a brown powder. The acid tar from green oil was of a brown color rather than black, and was also more nearly fluid than that from black oil.

All of these facts, which have been accumulated through many years, confirm the prediction that I made in 1871, which I have quoted above. It was also confirmed by the results of a fractional separation that I made a year ago, which results are stated in a paper which was read February 5, 1897, before the American Philosophical Society. This prediction is also confirmed by the results detailed by Professor Mabery, as he shows that the constituents of California petroleum are not to any appreciable amount paraffines, but belong to series having the formula C_nH_{2n} . I am convinced from the result of my own fractionation that a proportionately very large amount of benzole and its homologues are present, which fact accounts for the difficulty which has been experienced in all the attempts that have been made to prepare illuminating oils of good quality from California crude petroleum.

The polymerization of these oils, and the rapid conversion of both oils and tars into maltha and asphaltum, is, no doubt, due more largely to the presence of the unstable nitrogen and sulphur compounds than to the presence of any series of pure hydrocarbons. To what extent it is advisable to remove these compounds of nitrogen and sulphur from commercial products is, of course, a commercial as well as a technological problem. So, too, is the question as to how far these oils can be profitably made a source of pyridin and other benzole compounds.

*S. F. Peckham, *Ann. Jour. Sci.*, III, 48, 250.



GASOLINE ENGINE IN PARTS FOR TRANSPORTATION.

High Class Gas Engine.

The illustration shown herewith shows the parts of a complete 10 Actual H. P. Weber Gasoline Engine, recently built by the Weber Gas & Gasoline Engine Co., 434 Southwest Boulevard, Kansas City, Mo., and installed by the Decatur Copper Mining Co., near Jerome, Ariz.

The complete plant set up weighs 7200 pounds. The plant was sectionalized for burro transportation, bringing all the parts down to required. In addition to hoisting, the engine will be used for operating a Cornish pump and power for ventilation. The Weber people have built quite a number of these machines, as their engines, hoists and pumps are used in out of the way localities that are almost inaccessible; this is especially true of the large number of mines in the great Southwest and Mexico.

A single burro can carry fuel enough on one trip to operate a 10 H. P. gasoline hoist ten days, operating twenty-four hours per day. This point makes these engines especially valuable where all fuel must be freighted or where water is scarce, since a 10 H. P. hoist uses only two gallons of water in twenty-four hours.

American Trade With India.

The Philadelphia Commercial Museum, in its report on the American Trade with India, gives a general synopsis of the commercial and natural conditions of India, a fund of statistical matter, and treats separately and in detail the agriculture, mineral wealth, forest wealth, manufactures and railways. The report sets forth a general resume of India's foreign trade and the American trade with India; tells the principal commercial centers, giving the number of inhabitants; the business methods in India, such as the payment and settlement of disputes, banking and currency, etc. A few friendly suggestions from India are also included in the work.

In speaking of the mineral wealth of the country, the report says:—

"The mineral wealth of India is tolerably abundant, but there are obstacles to its development in the face of foreign competition. There are some extensive and numerous small coal fields. The production of coal in India is rapidly increasing. In the period—1880 to 1891, it increased from 998,000 to 2,329,000 tons. In 1897 it amounted to 3,848,013 tons. The region that produces the greatest quantity of coal in India is the southern part of Bengal, to the west of the Ganges.

Iron ore is widely scattered over the country, and with the profuse employment of charcoal, the best material for smelting, the natives make iron of excellent quality; but, in the districts most accessible to foreign commerce, this expensive mode of working has been almost extinguished, in consequence of the import of European iron and ironwares.

Among other Indian minerals of importance is gold (in Mysore, in Madras, and in Chutia Nagpur). The Aravalli mountains contain granites, syenites, white and colored marbles. Diamonds are found in Djemma and Pannah. Petroleum was produced to the amount of 15,057,094 gallons. The

output of salt amounted to 1,026,774 tons."

The most valuable feature in their report, however, is the Commercial Directory. The directory has been compiled in part from reports by the firms themselves and, in part, from the latest Indian directories. While it may be accepted as substantially reliable, no responsibility is assumed by the Museum for their correctness.

The Wm. Powell Co., of Cincinnati, Ohio have issued a pocket edition of their catalogue, No. 7, for 1898. In presenting this addition to their Pocket Steam Catalogue, they endeavored to furnish such valuable and important tables and other information as would be an assistance in the line of your daily avocations. From the limited size of the edition, the matter therein has been necessarily greatly condensed and simplified, useless repetition and technical obscurity have been, as far as possible, avoided. Great pains have evidently been taken to insure accuracy of statement in formulas, tables or other information.

High Speed Crushing Rolls.

We call attention to the type of rolls illustrated herewith as the embodiment of all that is desirable in the most modern improved rolls for ordinary usage. We also commend for special uses, high speed rolls of narrow face, which, as built by Fraser & Chalmers, 133 Fulton street, Chicago, Ill., are of the latest and best design in every detail. Their standard sizes of high speed rolls are 56 inch diameter by 8 inch face and 44-inch diameter by 5-inch face. These improved "New Style" rolls are built in the sizes 36x12 inches, 30x10 inches and 24x8 inches.

They have patterns for smaller and cheaper rolls which lack the refinement of adjustment in the rolls described, but may serve a purpose in some cases.

The most important parts of rolls are the shells, which take the wear of reducing the material crushed.

The rolls illustrated here embody all essential improvements, and are designed to accomplish the best results with the most simple details.

They are of heavy build, mounted upon a solid base all in one piece, like the base of a self-contained engine. The bearings of one of these rolls are framed in one piece with heavy base and the bearings of

the other are movable in slides planed in the same base. All material is placed where it will be most effective to resist stress and make a strong and stiff machine.

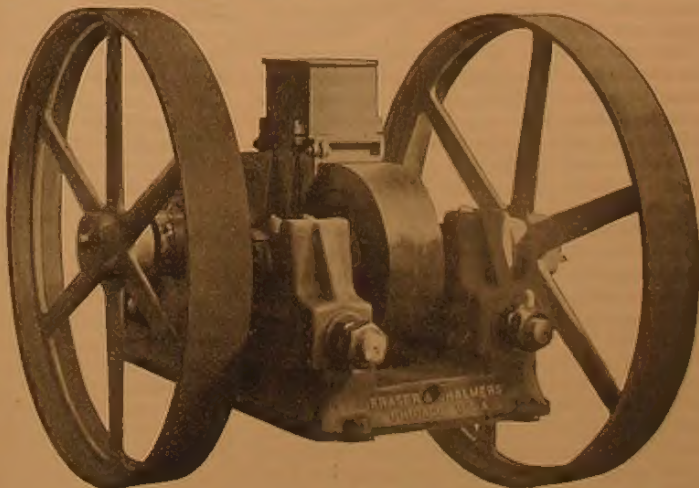
Nests of powerful springs hold the rolls truly to their work with a uniform crushing pressure. The roll shafts are extra heavy with ample journal surface, and at the same time the necessary flexibility is secured by mounting them in boxes which have finished cylindrical bearings in the frame. The construction permits the passage of an article too tough to crush, such as a piece of steel, and accommodates any unevenness of feed.

The cap bolts for bearings are placed in an angular position converging in such a way as to lock one another, and be more secure than caps having parallel bolts. The nests of springs do not have to be disturbed for the removal of shells, rolls or shafts. Their position is stable and unaffected by such changes. By use of plates on the main bolts the rolls may be set apart positively to any convenient opening.

The feed hopper is provided with inclined baffle plates which distribute the material to be reduced so as to furnish a more even feed. The cut shows the machine without the housing, which is indispensable for dry crushing, and is furnished when specifically ordered.

The housing covers the rolls neatly, preventing dust from getting into the atmosphere or to the bearings. It is provided with plates and springs bearing against the inner sides of the frames so that the housing has an elastic adjustment to conform with any movement of the roll bearings when these shift in their cylindrical seats, and thus remains dust tight in any case.

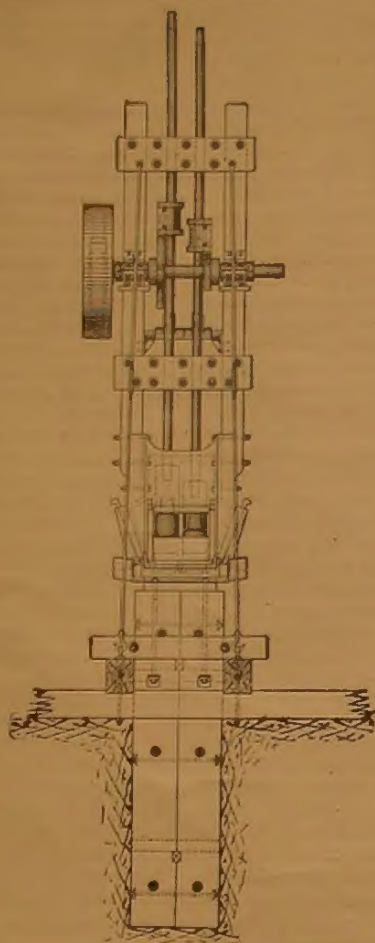
The size illustrated, 30" dia. by 10" face is of comparatively narrow proportions, which is favorable to evenness of feed, uniform wear and long service. The size is one recommended as of most general adoption. Rolls of good size have greater durability, and render better service than rolls of skimmed proportions required to do the same work. These rolls run at the usual peripheral speed of 600 to 800 feet per minute, have a large capacity depending upon material crushed, and fineness of reduction. In large concentrating works the course and handling of material is usually such as to make it convenient to divide it between several sets of rolls. It will thus be seen that the range of service for which these rolls can well be chosen is a large one, comprehending both large and small works.



HIGH SPEED CRUSHING ROLLS

TABLE OF DIMENSIONS.

NO. STAMPS	WEIGHT OF STAMPS	PULLEY		DIAM. CAM-SHAFT	DIAM. STEMS	DIAM. SHOES AND DIES	WEIGHT	
		DIAM.	PACE				MORTAR	COMPLETE
2	900	48"	10½	43½"	3 3-16"	8½"	2872	8200
3	900	52"	10½	43½"	3 3-16"	8½"	3615	10800



FRONT VIEW OF TWO STAMP BATTERY.

TWO AND THREE STAMP PROSPECTING MILLS.

The two and three stamp mills herein described embrace in their design all of the best features of other mills now on the market and other valuable features which are entirely new.

In designing the mortars particular attention has been given to the distribution of the metal in such a manner as to avoid unequal strains in cooling with the object of lessening the liability of the mortar to crack when in use or through rough handling during transportation.

The mortars have three discharge openings (on the front and on both ends) and the pulp from the end discharges is brought to the front by means of an apron or trough where it joins that from the front discharge and all then flows over the plate. This apron is cast separate from the mortar to which it is attached by bolts—experience having demonstrated that this form of construction is preferable to that in which the apron is cast to the mortar, as there is less liability to breakage during transportation and, in the event of breakage, a new apron can be substituted at small cost.

The silver-plated copper plates for lining the mortars are furnished with these mills and are included in the price. They are one-quarter (¼) inch thick and a wrought iron plate is riveted onto the bottom to stiffen them. Each end of these plates is held in place by a key which can be loosened and the plate raised or lowered to suit the height of

discharge and the wear of the dies. By this arrangement the use of chock blocks is avoided, and there is no possibility of an accumulation of heavy matter to choke the discharges as is the case when chock blocks are used.

Two sets of screen frames with different widths of rails are furnished with the mills so that the height of the discharge can be regulated as the dies wear.

The cams are built on the most approved lines or curves and will lift the stamps with a minimum of friction and power.

The cam-shaft is set into the boxes from the front side of the mortar and the stems are set into the guides from the back so that either can be removed without disturbing the other. This is a great advantage in that it enables the operator to make repairs quickly.

The material used and the workmanship throughout is of the best and the mills will be found to be modern in every detail of their construction.

They are built in but one size (900 lbs. stamp) and the price includes the ironwork complete for the mill, Oregon pine battery posts, oak guides, inside amalgamating plates, cam shaft, pulley and all bolts, nuts and washers for the frame, mortar block and foundation. The mortar block, sills and stringers and the outside amalgam plates are not included.

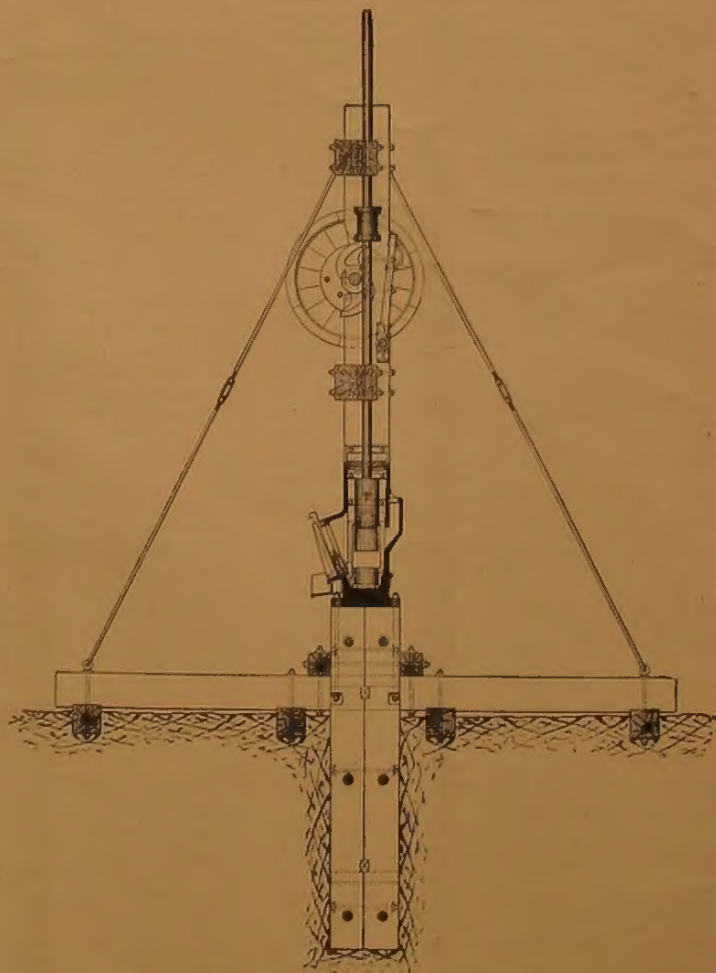
For further information address The Parker & Lacy Company, 21 and 23 Fremont street, San Francisco, Cal.

The American Diamond Rock Drill Co., of 120 Liberty street, New York, reports among recent orders a drill of 1500 feet capacity for Russia; hand drills for the Klondike and Mexico, a No. 7 drill for northern New York, two 1000-foot drills for Mexico and one drill for Sumatra. They also report a marked increase during the past two months in the diamond drill supply trade, both domestic and export, and considerable activity in orders for allied machinery. The diamond pointed core drills

manufactured by this company cannot be excelled for prospecting purposes.

Cause of Boiler Explosions.

The cause of all boiler explosions is excessive pressure, and the fact that such disasters are of frequent occurrence, whether arising from neglect or otherwise, points forcibly to the necessity of providing against them in every possible way. There are safeguards against the danger of explosion which manufacturers and owners have in their power to use that may be relied upon to largely diminish the danger. The first is in the use of a perfect automatic safety valve, absolutely certain in its action, prompt in opening and closing, and fully sufficient in capacity to relieve the boiler from any excessive pressure beyond the amount intended to be carried as a safe limit. The "Pop" safety valves manufactured by the Consolidated Valve Co., of 111 Liberty street, New York, will do the work. Send for their latest catalogue just out.



SIDE VIEW OF TWO STAMP BATTERY.

THE SUTRO TUNNEL.

Virginia City, the pioneer mining town of Nevada and the United States, is perched on the eastern face of Mount Davison, the culminating peak of the range of mountains in which lies the famous Comstock silver lode. Gold was first discovered in Nevada in the spring of 1850. It was found in what is now known as Gold Canyon, by a company of Mormon emigrants on their way to California. From \$5 to \$8 a day could be made by mining the gravel of the canyon, but this seemed small wages to men who expected to gather gold by the pound in California, therefore all but one or two families went on across the mountains.

Following up this gold in after years led to the discovery in 1859 of the rich deposit of gold where now stands the town of Gold Hill. This gold was in a vein that afterwards became famous as the Comstock silver lode, but at Gold Hill it was gold-bearing on the surface.

In Six mile Canyon, gold in paying quantities was found in the year 1857, just above the Sugar Loaf Mountain. The following up of this discovery led to the striking of silver at a point just above the head of the Canyon where Virginia City now stands. The great discovery was made in 1859, by Peter O'Riley and Patrick McLaughlin.

One of the greatest works ever undertaken on the Comstock was the building of the great Sutro Drain Tunnel, which, starting at the Carson River, has a length of 21,120 feet, or even four miles. It taps the lode at a depth of 1,600 feet and drains all the mines of both towns. It was only through the indomitable will of the world-famous Adolph Sutro that this gigantic enterprise was carried to a successful issue.

The death of this great man on the 8th of August, 1898, marks the ending of one who has endeared himself to all who knew him, one who has made fortunes and lost them, and by his self-reliance made others. His bestowal of various public bequests has caused his name to be written on history's pages, where, for generations to come, it will be prominently held to the front. At the time of his death he was 68 years of age. He was a native of Aix la Ch pelle, Prussia.

He came to California in 1850; engaged in mercantile pursuits in San Francisco for eleven years, then went to Nevada where the Comstock lode was beginning to attract attention.

He started a custom mill at Dayton, Nevada, and rapidly made money. While

there he conceived the idea of tunneling the Comstock, organized a company capitalized at \$5,000,000, and after a series of defeats and opposition that would have dismayed a less energetic man, he succeeded in getting a bill through congress authorizing its construction. Work began on it October 19th, 1869, and in was pushed for nine years to completion.

The construction of this mammoth tunnel cost in the neighborhood of \$4,500,000, having gone through zones of very hard material besides being hampered by the great quantity of water.

As the time went on it became evident that the royalty on Comstock ores would not be as fruitful a source of revenue as had been anticipated, for even twenty years ago the great lode showed signs of depletion.

In 1879, Sutro sold almost his entire interests in the great tunnel that bore his name, and with a fortune estimated at \$5,000,000,

principal Comstock mining companies have taken their first definite and united action regarding the great project of unwatering the Comstock mines and resuming operations below the Sutro tunnel level.

Twenty-four companies were represented at a meeting held in the office of the Consolidated California and Virginia Company in the Nevada Block at San Francisco. These representatives had been elected at various meetings of the respective boards of directors.

The joint committee organized by electing Charles H. Fish president and A. Waterman secretary, and by creating an executive committee consisting of Wm. Bannan, E. P. Barrett, George R. Wells, John Landers and Charles Hirschfeld. The committee did the wise and natural thing by taking steps to compile all the reliable information obtainable concerning the actual condition of the flooded levels of all the mines and the possibilities of

their profitable operation. To this end the superintendents of all the mines were ordered to report to the committee by September 14 the condition of the mines below the Sutro tunnel level when these mines were abandoned sixteen years ago.

The secretaries of the different companies were directed to compile all the similar information in the past reports of superintendents now on file. This getting together all that is really known about the flooded depths will form a starting point and clear the way for further action. So we may look, it is hoped, for a resumption of operation in the greatest silver producing district in the world.

The last step taken in the direction of deep min-

ing on the Comstock is the formation of the Comstock Pumping Association, composed of the presidents of the different Comstock mines. The next step will be the establishment of a pumping plant to drain lower levels.

The amount of ore taken from the Comstock lode is beyond estimation, but the ground that has been excavated to the depth of from 1,500 to 3,000 feet, forming catacombs surpassing by far in extent those of Rome, will give an idea of the work accomplished there. Still there are on the Comstock lode many large areas of virgin ground to be explored and great and rich bonanzas may yet be found. What is known as the "Big Bonanza," (an immense body of rich ore found in the Consolidated California and Virginia mines) was hit upon at a time when all the Comstock was at a low ebb and when many were deserting the two towns, Virginia City and Gold Hill, utterly discouraged.



SUTRO TUNNEL. ADOLPH SUTRO, FOUNDER OF THE SUTRO TUNNEL. SUTRO TUNNEL AND MULE TRAIN. SUTRO FROM THE TUNNEL. SUTRO MANSION AND MACHINE SHOP.

went to San Francisco, and bought one-tenth of the city's area, a portion of which, fronting on the ocean, he proceeded to beautify and adorn. He spent great sums in turning what was a sand heap and rugged cliff into one of the handsomest gardens in the world, and in latter years built what are believed to be the largest and finest baths on the continent, built and equipped an electric line of railway from the city thence. In 1895 he was elected mayor of San Francisco.

He was a man of intense impulses and indomitable will, self-reliant, successful; a born fighter, and would have filled a notable place in any department of life that he had essayed to occupy. It is thought had not his mental powers failed he would have willed his great library and fine pleasure grounds to the city that had honored him and in whose welfare he held so large a part.

Recently the leading representatives of the

CORRESPONDENCE

COLORADO.

DENVER, Colo., Sept. 20, '98.

EDITOR JOURNAL:—From recent reports obtained at the Sampling works and Chlorination office, Boulder has increased her output for the month of August over the corresponding month of 1897 one hundred per cent. The general feeling in mining circles is much more hopeful and encouraging. Many of our large producers at Ward, including the famous Utica, have shipped but little ore to market this year. Owing to the destruction by fire of the machinery, shaft house and the upper portion of the main shaft of the Utica, this productive property has not been able to make its regular dividends for the first time in many years. The company has equipped the mine with new and elegant machinery for future operations and larger compressors for more extensive operations.

The Dew Drop mine does not produce for shipment. The purpose of the management is to run the main tunnel through the entire length of the property on the trend of the vein exposing the ore and allowing it to remain in the mine for future stoping.

The huge bore is now 3000 feet long and a compressor costing \$8500 has recently been put in place to push the work of developing the property much more extensively.

Near the Dew Drop property are the Leviathan Tunnel and Lode claims, owned by E. E. Ives of Kansas City and Frank C. Smith, Denver. These parties own eight lode claims on Sawmill hill, Ward, and are pushing work on the tunnel on the trend of the Ives vein, which is four feet thick, thoroughly mineralized. This is one of the greatest tunnel schemes in Boulder county, full of rich promise for an immense mine. Veins will be encountered about every two hundred feet at a depth of from 200 to 1000 feet below surface.

The new Pyntec Smelter has been built within a thousand feet of the mouth of the tunnel and will purchase the entire product of this group of mines, treating the ore for about \$4 per ton; by this means the Leviathan property has an immense advantage over other mines in this section.

The Ward Rose mine is producing very high grade sulphide ore and abundance of it. Recently miners have been put to work stoping out the heavy blocks of mineral exposed in the mine, making large returns to the owners.

A new chlorination plant of 30 tons daily capacity is drawing near completion on the Amalgam mining property. Sugar Loaf, which if handled successfully, will revolutionize mining in the district. The ore is easily treated and at little expense. Other plants are being erected throughout the county for treating the immense quantities of low-grade telluride and sulphide ore now lying on the dump as worthless material. Millions of tons of this stuff could be utilized to a profit by adequate machinery and the time is fast approaching when the proper process will be built to meet this great want.

W. M. RULE, M. E.

The production of gold from the Cripple Creek district to date, a period of seven years and eight months, is over \$44,200,000 as follows: 1891, \$200,000; 1892, \$600,000; 1893, \$2,400,000; 1894, \$3,600,000; 1895, \$7,200,000; 1896, \$8,000,000; 1897, \$12,500,000; 1898 (eight months), \$9,700,000; total \$44,200,000.

Miscellaneous Mining News.

ALASKA.

No Place for Poor Men.

A Yukon paper says: "There are with us many who are destitute, and who cannot find work. It is certainly the wise and charitable view to insist that these people would be far better situated back home than they are here, with impending winter at hand. Those who need relief and must be assisted would be best relieved by being sent home. Dawson is well able to care for and house all who are needy and worthy, but these people will be happier and Dawson's charity most wisely exercised if they are sent to their homes. To attempt to winter here, without prospect of labor, is, to say the least, the rashest folly. It means privation, hardship and suffering of the worst sort, and no one who is wise will leave a stone unturned in the effort to go outside if unprepared to stay here.

ARIZONA.

The Azurite.

Thomas Hughes, manager of the Azurite Copper and Gold Mining Company, was in Tucson last week, looking after the smelting plant now under repair in Gardner & Worthen's shops. He says there is abundance of water for the thirty ton water jacket and he believes sufficient for a fifty-ton jacket. During the last thirty days he has been developing the carbonate body of ore, and he states that he has discovered that this is a blanket, averaging from 6 to 17 feet thickness, running under the surface from five to fifty feet.

He also reports a large body of ore uncovered on the Little Mammoth, the vein on surface being over fifty feet wide. This is an entirely new ore field and different in character from that developed on the other claims. The grade seems good and carries gold. A few days will determine the importance of this new development, which at present has the appearance of being a very big Mammoth. On the 200-foot level the breast of the drift is all in ore and of good value.

Three carloads of machinery arrived at St. Thomas in Mohave County last week, for the Spenazuma Company. The machinery is a portion of a smelter, and it will be transferred to the mines and placed in position immediately. The balance of the machinery is on the way, and is expected to arrive any day. The smelter will have a capacity of 500 tons per day.

CALIFORNIA.

BUTTE COUNTY.

H. Francis and others of San Francisco have bought the Buchanan Hill mine in Butte County. The Buchanan Hill is one of the oldest drift gravel mines in that section, and was profitably worked many years ago. At present a tunnel is being driven to tap the channel at its lowest point, and this tunnel will be driven ahead steadily until the gravel is reached. New buildings will be erected on the property, new and modern machinery erected, and the mine will no doubt become a gold producer at an early date.

CALAVERAS COUNTY.

Lightner Mine Flooded.

At Angeles Camp, the water in the Coleman mine broke through and flooded the Lightner mine up to within 125 feet of the surface, September 11th, at about 2 o'clock. The skips of the Lightner shaft are stuck at the 200 foot level, and all facilities for unwatering are hung up. The mine was not being worked at the time. Had there been any one working loss of life would have occurred.

INYO COUNTY.

At the Inyo Consolidated Mining Company's properties which are located adjacent to Mountain Spring Canyon, in the southern part of the Argus Range of mountains, Inyo County, Cal., and whose office is at 330 Laughlin Building, Broadway, Los Angeles, there are fifteen distinct properties, and each represents a claim of 600x1500 feet, at an average elevation of four thousand feet, which gives them a splendid climate. The company was organized November, 1897, under the laws of Arizona, with a capital stock of \$1,000,000. Average assay per ton, \$12.31. Last assay, from bottom of shaft, 85 feet, \$25. It is the intention of the company to put up a plant by latter part of October, and concentrate their ore and ship their concentrates. Very little timbering is needed and no bother with water. The only drawback at present is the long distance inland from shipping conveniences and the lack of feed for teams, all of which will be obviated when the Santa Fe branch of road is extended from Johannesburg.

KERN COUNTY.

The Wedge mine has just struck an astonishing rich vein of ore at a depth of 350 feet in the west drift. It is peculiar looking, nothing like it ever having been found in the camp. It is stratified and ribbony in appearance and is sulphuret ore. It will mill \$200 per ton.

L. F. Parsons, who has just returned from Randsburg, reports the Eureka mill running steadily on custom ore. Two men's work, for a little less than one month, in the La Crosse mine, in the Stringer District, produced four tons of ore that yielded at the Eureka \$150 per ton. The Napoleon has a twenty ton lot of ore that will average \$100 per ton at the Eureka.

Mr. Parsons said very low rates were being established for hauling and milling ores at the Barstow mill. Though Mr. Cook has an up-hill job, he is meeting a wonderful success. One car from the Wedge property will be the starting of a thousand tons from that property, if the mill run is satisfactory. Other companies have followed, and it is hoped the Barstow mill will be a success after all.

MONO COUNTY.

We hear that Cameron and McCormack, of Bridgeport, struck a good ledge in the tunnel of the Cowboy mine, on Green Creek, and that the ore assays \$10 a ton. They have done some hard work, the tunnel having been run 600 feet, and are deserving a good mine for their perseverance.

RIVERSIDE COUNTY.

J. J. Arbois, the owner of the quartz mill at Dale, arrived in San Bernardino last week, bringing with him tailings and specimens of ore to be assayed. He reports that the hot

weather has been terrific on the desert until the past few days, when it cooled off considerably. Mining operations have been very quiet on account of the weather, although his mill has been running steadily.

SAN BERNARDINO COUNTY.

The Dean quartz mill of ten stamps has been moved from Oro Grande to the Slate range, and they expect to start up about October 10th on the old Hogan mine. This mine is patented and a great deal of work has been done on it. One lot of 100 tons milled at Kaue Springs went \$33 from the plates with the tailings worth as much more, which will have to be cyanided. There is one shaft on the mine 150 feet in depth, with a vein of ore running from two to thirteen feet in thickness, with drifts each way. They are now working eight men and propose to increase their force, five men left Randsburg, Sept. 23rd, to go to work on the mine.—*Randsburg Miner*.

SISKIYOU COUNTY.

The old Spencer mine on Humbug is rapidly coming to the front again. For a long time this property was one of the best gold producers in the county. The water has been pumped out of the shaft and sinking has been commenced. In the shaft there is a three and a half foot ledge, while in the drift it is eighteen inches. The ore mills \$14 in free gold and carries a large amount of high grade sulphurets.

TRINITY COUNTY.

This week G. L. Bailey of Dedrick sold the Stanley-Helena group of mines owned by him in that district to A. G. Hubbard, of Redlands. This group of mines is situated near the Chloride-Bailey mines, in the same quartz belt, and recent developments have shown up a good body of ore. A force of men have been put to work, and the mine will be opened up and thoroughly developed, and a milling plant erected on the property. The Canyon Creek district is showing up as one of the best quartz sections in Northern California, and we predict a brilliant future for the camp.

TUOLUMNE COUNTY.

At the Kanaka everything is looking well, and operations going ahead rapidly, considering the handicap a dry winter has resulted in saddling on all the mines in the county. The mill runs twelve hours out of each twenty-four, enough water being secured from one of the lower ditches to drive the machinery.

COLORADO.

Ore Shipments.

The ore shipments from the Black Hawk station of the Gulf road for the month of August were the largest tonnage ever made from Gilpin county. The number of cars were 319, the tonnage 5,742. For the same month of last year the number of cars was 336 and the tonnage 5,376, showing a gain for this year of 366 tons. Last year the shipments were figured at sixteen tons to the car, but this year, since the road has added cars of a carrying capacity of twenty-five tons, the average of carload shipments for last month was eighteen tons. This increased tonnage on the 319 cars makes the shipment for the month read 342 cars, an increase of six cars over last year. August of '97 was the ban-

ner month of that year, and the greatest in shipments of any month in the history of the county, and as the record of August '98 shows an increase over last year, it will be readily seen that Gilpin county is holding her own in the production of mineral and wealth.—*Mining Reporter*.

IDAHO.

The De Lamar report for July shows that bullion valued at \$31,810 was produced by the cyanide treatment. The total revenue was \$35,730, and the total expenses \$29,710, leaving a profit of \$3,020.

The Standard concentrator at Wallace is handling the Hecla ore from Burke now. Eighteen cars were received at the mill in the last two days. The ore is of very good grade and will make fully 300 tons of concentrates. The East Helena smelter is the destination of the Hecla ore.

MICHIGAN.

Important Improvement.

Iron Ore, published at Ishpeming, gives the following:—Improvements are under way and contemplated at the old mine workings of the Lake Angeline Iron Company that will be a prime factor in the production of ore at reduced cost in future.

The new shaft, which was started some months ago, has been sunk to the fourth level, and ore is now being hoisted through it. Connections have been made with it from A and D shafts, and the ore being hoisted is from pillars in these two openings.

C shaft is also to be connected with the new one, and a drift is being driven for that purpose. This will be 1,300 feet in length and eighteen feet below the drift mentioned above connecting with A shaft.

By the beginning of next spring all the ore from the old workings will be hoisting from the new shaft, which, by the way, is one of the largest and best equipped in the mining district and the old shafts will have been closed.

An electric haulage plant will be installed for the rapid handling of the ore underground and a similar system will prevail on surface. This will mean much in the cheapening of the cost of production over the old method of conveying the ore to shaft and stockpile by hand. The Lake Angeline Company is a progressive one, and its equipment and method of handling its production is equal to the best employed in the iron mining regions of the upper country.

MINNESOTA.

The iron ore rate case, adjourned a month ago to September 6th, has been in progress the past week in St. Paul, and will now be held in Cleveland and Chicago. In St. Paul the testimony was chiefly confirmatory to that given in Duluth in August, as regards costs of roads, excessive wear on roadbeds, equipment and rolling stocks, etc. The comparison in ton mile rates between the iron range roads and other lines, claimed by complainants to be much to the detriment of the iron ore lines, was shown to include in their case all terminal and other charges, and to be for a wearing one way traffic concentrated into a few months, while on other roads terminal charges are extra, and the traffic is general and continuous. The commission in St. Paul

had before it many of the leading railway managers of the northwest. In Cleveland the point intended to be brought out is, in brief, that reduction of rates would help no one but the furnace man, by giving him an ore lower in price by just the reduction in rates. In Chicago a number of the biggest railway men of the United States will testify.—*Engineering and Mining Journal*.

MISSOURI.

The Narragansett Mining Company, a mile north of Webb City, has its new shaft down 160 feet, and in a 5-foot face of ore. The company has three paying prospects, and the new pump drains the ground to 200 feet.

The old mines at Scotland, east of Duenweg, are being pumped out. A. Haskins, in sinking, struck lead and silicate at 12 feet. Truax & Co. have two runs of ore at 45 and 70 feet. Rains & Co. have good lead at 25 ft. Moore & Co. have good lead at 15 feet.

The Yellow Rose Mining Company has been organized with a capital of \$25,000, and the following are the stockholders: A. O. Nicholas, W. F. Hammett, C. H. Hammett, A. Braithwait and M. L. Sears. They have purchased the Yellow Rose and Oklahoma mines, on the Inter-Urban lease, at Central City, and proceed to further develop them.

MONTANA.

Eight hundred tons of second class ore have been shipped from the Moulton at Barker, Meagher county by the smelter company since it commenced leasing the second class ore of the mine. The new 1100 foot tunnel is nearly through now, there being about 25 or 30 feet more to go.

Hugh Stevens and associates at Barker, Meagher county, are working with good results on the Barker and shipping two cars a week. They are also running a 240-foot tunnel on the Equator, and this will cut the vein at 120 foot depth. They had put in a whim, but the water was too much for them. Rather than put in expensive mining machinery the tunnel was decided upon.

Steve Pierse, who is leasing on the Tiger at Barker, Meagher county, has sunk 50 feet on the old Tiger shaft, and will now crosscut to the vein, estimated at about ten feet. The pay streak is supposed to be about three feet wide and will run 18 to 20 ounces in silver and 30 to 45 per cent lead. Billy Stark and Phil Walsh are with him on the lease and they are supposed to have about the best thing in Barker.—*Helena Independent*.

NEVADA.

Sam Case and Henry Jaegels are taking out ore from the Homestake and another mine and Archie Valencia and another man are at work on the Bourbon (formerly the Redlight) mine at Silver Peak, and have a large ledge with streaks of good ore in it. These are the only people who are doing any development work on the hill.

Lively De Lamar.

De Lamar is very lively at present, there being nearly 500 men at work in the camp. The De Lamar Company has decided to change the process of working the ore from a dry crushing one to a wet one.

OREGON.

The 13-mile ditch which has been under construction on Grave creek all during the summer for the John C. Lewis Co. was practically finished last week by Messrs. Greer and Mackin, the contractors. This ditch takes the water at Placer from the terminus of the Hampton & Lewis ditch and puts it on the high bluff back of Leland. The two ditches together are about 28 miles in length.

R. B. Jennings, of Table Rock, last week sold his quicksilver mines on Evans creek to parties from Port Townsend whose names are given as W. W. Folger and E. W. Molander. The conveyance embraces 260 acres of land, Mr. J. still retaining a fourth interest. The ledge has been developed by a 100-foot tunnel and a 75-foot shaft, and is said to be 100 feet in width. This ledge was first prospected some 20 years ago by Rogers and Houston. The purchasers are said to represent English capitalists, and it is their purpose to at once develop the property on an extended scale.—*Oregon Mining Journal*.

SOUTH DAKOTA.

Black Hills Notes.

Ore is being hauled to the Hildebrand mill, at Gayville, from the Omega mine, which is owned by P. L. Gibbs and associates. The mill will be started up soon.

A carload of ore is soon to be shipped from the Grant lease of the Dacy property, at Ragged Top, which is promised to be the banner car of the camp. A sample recently assayed went \$300 a ton.

The Spearfish Cyanide Company shipped two carloads of ore from Crown Hill station last week, the ore being taken from the mines in Calamity gulch. The ore was sent to the company's cyanide plant, at Spearfish, which is about ready to start up.

Mr. John T. Jones, of Iron Mountain, Mich., and associates, operating under the head of the Gold Hill Mining Company, have purchased the Lucky Boy, Columbia, Krupp, and Gold Hill mining claims, located near Keystone. The price paid for the property was well up. Extensive development of the property will be commenced very soon.—*B. H. Mining Review*.

UTAH.

Bullion-Beck of Eureka, Utah, paid its regular dividend on the 15th of September. This brings the total to date to \$2,525,000.

Grand Central Mining Company's property looks well. The regular dividend of \$31,250 was paid on the 10th of September.

Assessment No. 13 of the Dalton Co. of Marysville became delinquent September 26th.

Thé Mammoth Mining Co. owns some ten patented claims in a compact 100-acre tract toward the head of Mammoth Hollow, in Juab county. The mines are showing up well, but this month's dividend will very likely be passed.

Mercur was quiet. The regular dividend was paid on the 20th ult.

The ore showing is said to be improving in the Omaha.

Sacramento Company's Mercur properties continue to produce ore. The regular dividend of \$5,000 has been declared, payable September 28th.

Daisy Gold Mining Company, at Mercur, is the latest proposed addition to the Salt Lake City stock board. It will probably be listed the early part of the week.

WASHINGTON.

The work of cleaning out the tunnels of the Old Dominion mine, near Colville, is progressing rapidly with three shifts of men. The length of the tunnel is about 4,000 feet, and it will require about two months to remove the debris accumulated by reason of a number of caves, some of which fill the tunnel completely.

The Bonanza mine near Bossburg continues shipping at the rate of two carloads of first-class ore a day. They are sinking towards the 500 foot level, which is being carried on at night. In the day-time the shipping ore is hoisted. The company will soon have a new hoisting plant. It will be a 60 horse power boiler and a 40-horse power engine. As soon as the new plant is installed ore will be hoisted from three levels. Supt. John Hanley says that it is his intention to continue sinking, as depth improves the quality of the ore.—*Miner and Electrician*.

FOREIGN MINING NEWS

BRITISH COLUMBIA.

The Van Anda.

Mr. H. W. Treat, of New York, secretary of the Van Anda Mining Company, will be on the coast again in about two weeks. He said their properties in Texada Island were improving daily in development. They have reached the 200 foot level by a double compartment shaft, and at 180 feet the ore body has widened out to 20 feet; seven feet of this went \$50 to the ton, and the other 13 feet \$12 per ton, and is splendid concentrating ore. At the 200 foot level it opens up a magnificent body of copper glance, 4 feet of which is 25 per cent copper.

Le Roi Litigation.

For the time being it looks as if the British America Corporation had been turned down. Advices by wire from Rossland state that Wednesday, September 7th, was the last day on which the solicitors of a majority of the shareholders of Le Roi could make application for the extension of the order appointing a receiver. Messrs. Daly and Hamilton admitted that they had not applied for an extension of the order. Messrs. McDonald, Clute and Cronyn, solicitors for the minority or Turner interests, said that this practically settled the question of the receivership, that there would be no more receivers. The period for which the output of ore was limited to 100 tons per day expired on Thursday of same week. The force of men has been increased to 225 men and 21 machine drills are at work. The result is that shipment will be at once increased to 350 tons per day, and will be kept at this rate for some time. Of this quantity 200 tons daily will be taken in the mine, and 150 on the dump, where 2,000 tons are accumulated. This is a victory for the Turner faction.—*British Columbia Mining Critic*.

MEXICO.

Forty-five miles east of the railroad, over a good road from Ortiz station, Pio Quinto Moreno has recently denounced some very promising mining properties, and last week he received from the City of Mexico his denouncement papers, vesting the title in him. The properties denounced include fifty-four pertinencias of ground, through which run three quartz ledges. One ledge, running north and south is twenty feet in width, and the ore assays \$2, \$4.50 and \$6.00 per ton in free gold. The other two ledges run east and west, are ten to twenty feet in width, and the ores assay \$2.50 to \$3.00 per ton. The surrounding ground all over the mountains is rich in placer gold, which will yield thirty to ninety cents per cubic yard. The locality is three miles east from the Agua Caliente Grande, in the Yaqui mountains.—*The Oasis*.

The output of only six mining companies operating in the Sierra Mojada district, amounted during June to 9,660 metric tons, valued at \$355,005, on which were levied state taxes to the amount of \$7,100, and federal taxes amounting to \$2,130.68. The highest grade ore comes from the Buenaventura, belonging to the La Constancia Company, which yielded on an average \$68.68 per ton.

LOWER CALIFORNIA.

Considerable important work is in progress near San Quintin, Lower California, at the salt beds. Messrs. Packard and Graham have just returned from a trip to these beds where they made some practical tests of the brine. The first appearance of these deposits strikes the stranger very curiously, says the *Lower Californian*—big flats that glisten like snow in the rays of the sun. There are some six or seven in all, stretching at intervals to the northward and separated from the sea by great sand hills. During the cooler months the flats become entirely submerged with the brine which bubbles up from a thousand springs on the side nearest the sea, but when warm weather approaches and evaporation becomes consequently greater, the brine crystallizes and largely disappears as a fluid, the surface of the flats becoming covered with layers of salt from one to five inches in thickness. Some of the crystals are beautiful, and at this season of the year crystallization is very rapid. The hydrometer shows the strength of the brine of the two southernmost lakes to be 1.01.

It is now proposed to experiment with the flow of these two latter basins, and Mr. Packard is having a large centrifugal pump put in position and connected with a pipe line which will serve as a drain. Should it be found after a period of continual pumping that there is a sufficient flow and no diminution in the strength of the brine, a plant for artificial evaporation and the development of salt works at San Quintin of considerable importance will be considered. The theory of these salt deposits, remarkable as they may seem, is a simple one. For ages, perhaps, the sea, after piling up these big mountains of sand, has been percolating with its waters the lower strata, which in turn have become so highly charged with chloride of sodium, that from the natural vent in the basins, slightly below the level of the sea, the water reappears converted into a strong brine. As to the capability or extent of these laboratories in the sand hills—that will soon be demonstrated.

RECENT ADVANCES IN METHODS OF CONCENTRATION.

BY J. W. KRILL, OF UTAH.

Mr. President, Ladies and Gentlemen:—

I did not expect to be called upon this afternoon to talk to you on this subject. I have not prepared what is technically called a paper. The ideas which I wish to present are perhaps largely personal, or based upon observation and some investigation on the subject of concentration. The subject of concentration is one which affects the miner when his high grade shipping ore has been exhausted, and he gets down on the "dumps"—to his low-grade ore. As long as he can ship his ores to the smelter direct, the subject of concentration does not affect him.

In Utah, I would say, we are particularly fortunate in that our camps surround our valley at a distance ranging from twenty to forty miles, so that the cost of transportation from the mine to the smelter is small. Our smelting works are equipped with the latest machinery and the charges are always moderate. The question of concentration, therefore, has presented itself to us in Utah only within the last few years. I think it has been developed in Utah in a manner which will interest many of you, and I hope that most of you will take advantage of the different excursions to see the mills which are now in operation in Bingham and other places.

By concentration, the operation is what might ordinarily be called "ore-dressing," as it is generally understood. I intend to include in my remarks not only the subject of the wet concentration of ores, but also that concentration which is known as the matte smelting, which I believe to be as important a branch of art as the wet concentration, and one which has been neglected. Wet concentration is almost entirely based upon the difference in specific gravity between the minerals carrying the metals and the values of waste material in the gangue recovered. In other words, we have different earthy materials, with their gravity approximating two and a half units of specific gravity, where we have galena with seven and a half to eight, and we have pyrites of iron and copper with a gravity of four and a half to five. The other metals ranging in between the two. Now, this difference, we will say, of two units or two and a fraction of units of specific gravity and the separation between the earthy materials and the valuable materials can be readily affected by means of concentration, (these ores are in the rough) first, by crushing of the ore, to reduce it to a suitable size, so that this difference in specific gravity can be brought to bear. That is to say, if I have a piece of quartz the size of this pitcher and a piece of galena of the size of the glass of water, they may actually weigh the same. The specific gravity of those two would therefore be the same. To separate them, I must reduce every thing, so that the particles of the same size are subjected to the same operation, as in that condition the specific gravity can work and we make our separation. I do not intend to go into details on the ordinary methods at all.

The general methods of reducing the ore are well known and then separating it by means of tables of the various kinds, vanners and other machines. Advances in the machinery line have been general. Possibly the most interesting of late, and one which has made

quite a stir, has been the Wilfly table, which is being largely introduced.

The separation of minerals which are close in their specific gravity, as, for instance, the iron pyrites, zinc, where the difference is only a fraction of a unit, is far more difficult. To attain this separation in the older works, as in Germany, where labor is very much cheaper, the separation is effected at the start of the operation, before the ore is introduced into the machinery at all, and is effected by means of hand-sorting. In one of the works which I have in mind, one of the largest concentration works in the world, which was erected some fifteen or twenty years ago, at a cost of a million and a half dollars. They employ from four hundred and fifty to five hundred boys, from the ages of eight to fifteen years, who sort out these minerals from the rock. In other words, the German knows that he cannot by his mechanical means separate these minerals so close to specific gravity; therefore he takes time by the forelock, and, before the ore is crushed too fine, he sorts out the pyrites from the rest of the material and provides a separate treatment by itself. In this country that would be practically impossible.

In Germany we are taught, or were taught, a study there—that metallurgy was the science of extracting metals from the ores. In this country we learn by experience that metallurgy must be the science of extracting the money from the ores. The difference between the two is a very important one.

Of all the advances which have been made in the matter of concentrating methods, one, that was widely known and advertised about two years ago, I would like to call your attention to, and that is the Peck centrifugal concentrator.

Mr. Peck, of Chicago developed the idea that, by giving the material to be separated a great acceleration, the difference in specific gravity being all multiplied by the same figure would be greater, and that by this means the separation could be more readily effected. He worked upon this for a number of years. He spent a great deal of money. I do not think I am exaggerating it when I say that there have been at least a million and a half dollars spent in development of this process. He changed his first apparatus radically and absolutely from a vertical cylinder to a horizontal cylinder. This process at the time it was heard from was very much noised abroad as a curio—for it handled ore and saved one hundred per cent, and did it for a certain number of cents per ton. These claims have since been abandoned, I think. Those of us who have had the privilege of seeing the machine had recognized its good points and its shortcomings. As many of you have not seen it, and as the opportunity will not be given in Utah, I would describe it as a horizontal cylinder, larger at one end than the other; the cylinder twelve to eighteen feet long and four feet in diameter, of hammered steel, turned as true as a watch crystal, is made to revolve in massive bearings, had a speeding of from six hundred to a thousand revolutions a minute. Inside of this cylinder is another, of slightly smaller dimensions, made of wood, which revolves upon other bearings, revolving inside of the bearings of the main steel cylinder. It is driven by belting, and is arranged by delicate machinery to be absolutely under the control of the operator. To this cylinder the pulp of ore is laid on, certain pipes controlling their valves, and the material from the cylinder is discharged out of the opposite end into other

valves, and suitably arranged for carrying off the waste material and also the concentrates from the cylinder.

Imagine to yourselves, therefore, this cylinder revolving in that direction, and the other cylinder within it revolving in the same direction, the outside one at a speed of we will say, seven hundred a minute, and the inside one at a slightly less speed—the pulp feed in from the left side. It is at once taken up by the cylinder and given this enormous velocity; the materials are thrown violently against the perforations of the cylinder, the heavier materials are there held, while the violent agitation washes out and delivers the sands at the other end of the cylinder. This operation is continued for a few minutes at a time. As the concentrates accumulate in the cylinder, against the walls of which they adhere very compactly, the inside wooden cylinder gradually recedes, the delicate machinery being so adjusted that its rate of recession is exactly in proportion to the amount of concentrates it has accumulated. In this way the space between the wooden cylinder and the outside cylinder remains from half an inch to three-eighths of an inch. When the charge of concentrates has been collected in the cylinder, the ore-stream is shut off and the outer cylinder is slowed up; instead of then running at, well, say seven hundred or eight hundred to six hundred revolutions, it has slowed up to three or four; the inside cylinder continues to operate at the same speed, and, of course, a contrary motion is set up inside, which at once loosens the particles all over from the sides of the cylinder and they are discharged in turn into another trough where they are settled. In this way the operation of the cylinder goes on, first loading then discharging.

As I saw the machine operating, it was taking from thirteen to twenty-one minutes to load and from five to twelve minutes to discharge it. It was concentrating about seven and a half to ten tons of slimes to one ton of concentrates, and the saving which was being made was told me, and I took some samples from it and assay was made which would indicate that a saving of from sixty to eighty per cent was being effected.

The material upon which this machine was working, I must state, had all been reduced so that it would pass a hundred mesh screen, this screen having ten thousand apertures to the square inch. This means that this machine needs for the successful operation a practical pulp. The material is floured to the finest degree, which is absolutely necessary for the operation of the machine that it should be in that condition. It is apparent to those conversant with hard ores that the comminution of a large amount of material to this fineness is a very expensive operation. This has been the cause of the failure of the machine where it has been applied to handling of raw crude ores as a concentrating machine by itself.

The machine has been very successful, however, in the handling of pulps which were suitable to it; such pulps arising from the handling of crude ores by other methods, such as pulp-tailings from concentrates and tailings from the old pan amalgamation on Comstock. On the Comstock, one of these mills handled up to two hundred and seventy tons per day, every cylinder producing concentrates at a rate of about twenty-seven tons—in that manner a saving of from eighty and up per cent in the values produced from tailings.

This machine, therefore, which was held

* A paper read before the International Mining Congress, held in Salt Lake City, Utah, July 8, 1895.

up to be a curio, I do not hesitate to pronounce an advance in methods in concentration when applied to the right place. By this I mean that with this machine, from a business basis, the mine owner who wishes to concentrate his ores, and who already knows his ores will slime, need not fear to crush those ores to the necessary point of comminution, in order to effect separation of pulp and slimes which he will make. Give him a centrifugal concentrator at the end of his mill, and I believe that the separation on concentration saved will more than counterbalance the cost of the operation. This, of course, is a question of dollars and cents.

I would say that the cylinder takes a great deal of power, about one hundred and fifteen horse power, and it handles on sulphiding ores about five hundred and ten tons; and, as I said before, the manner of concentrating ores which is lesser metallic, contains from twenty-five or thirty into one. Many of you who are acquainted with concentrating propositions will realize the possibilities which this machine would give. I would also suggest in this same line that one gentleman here has said that in Mercur there are five hundred million tons of two dollar ore exposed. Many of us who have had experience with the Mercur ores are aware that these ores slime very badly; that they are apt to percolate on account of this slime, and that the gold values could not be saved. Might it not be possible to crush these ores with it, take the slime resulting from this wet substance and run them through such a centrifugal concentrator and make a material which would pay to handle with cyanide or some treatment, or, possibly, by direct shipment to the smelter?

(To be continued.)

GENERAL NEWS.

Dissolution of Co-Partnership.

The partnership heretofore existing under the name and style of Loneragan & Calkins is this day dissolved by mutual consent. B. M. Calkins will continue the business at the old location, No. 127 W. First street, in Los Angeles, California, and will collect all bills of the firm. Mr. J. J. Loneragan retires from the business.

Dated September 14, 1898.

J. J. LONERAGAN,
B. M. CALKINS.

The business heretofore owned by Loneragan & Calkins will hereafter be conducted by the B. M. Calkins Company, No. 127 W. First street, Los Angeles.

On account of certain stories in circulation regarding the dissolution of this co-partnership, we wish to state the B. M. Calkins Co. has informed us there was no friction whatever between the partners, and that the aforementioned co-partnership had always been conducted in the most agreeable and prosperous manner.—[ACTING EDITOR.]

Water Motors.

The cheapness of water power is generally admitted wherever a stream or river is dammed, or where a natural fall is secured, that any comment thereon is superfluous. But the fact that city water can be utilized for power purposes is not so generally known. It is a fact, however, that, where power required is not too great, nor the water rates excessive, it is usually cheaper to use water

from this source than to purchase electricity or steam, provided that a motor economical in the use of water can be found. The motors made by the American Impulse Wheel Co., of 120 Liberty street, New York City, answer the requirements of cases of this sort. The first requirements of a good water motor are high efficiency, which means small water consumption in proportion to power developed, and durability—neither of which requirements are met by the average water motor now on the market.

Boiler Incrustation.

Geo. W. Lord, 316 De Lancey street, Philadelphia, Pa., manufacturer of boiler compounds, gives the following facts regarding the economical production of steam, which deserve the most careful consideration. All natural waters, however clear, transparent and palatable, are impregnated with suspended and dissolved organic and inorganic matters. The nature and proportion of the contaminating constituents, depending partly upon the chemical composition of the rocks and soils traversed; partly upon the gases, acids, and other reagents present in the water, and the temperature it may have attained. Water is the medium which conveys and deposits all the incrusting matters found in steam boilers; and as these solid mineral matters are of an absolutely non-volatile nature, they do not pass off with the steam, but remain behind and accumulate in the boiler, where they are eventually precipitated by the elevation of temperature and evaporation of the water, forming the thick and heavy mineral incrusts popularly designated as boiler incrustation.

There is no subject connected with the use of steam of so much importance as that of maintaining the cleanliness of steam boilers and protecting them from the evil effects of incrustation and corrosion, as upon this not only depends the safety of life and property, but, in a very considerable degree the cost of producing the required power.

It has been demonstrated, by repeated and accurate experiments, that a scale of 1-16 of an inch requires an expenditure of 12 per cent more fuel; and a scale of a quarter of an inch 60 per cent more fuel, and as the scale increases this ratio rapidly increases.

To raise steam to a working pressure of 90 lbs., the water must be heated to a temperature of 320° Fahr. This, through a ¼-inch shell, requires a heat on the external surface of about 325° Fahr.; but with a ½-inch scale, 700°—almost a red heat—is required. The higher the temperature at which the iron is kept, the more rapid is the process of oxidation, and at any temperature above 600 Fahr. it soon becomes granular, brittle and crystalline, with the loss of its physical properties, and with no more strength and tenacity than than ordinary cast-iron. In such a condition the boiler soon wears out and is liable to explosion at any moment.

PERSONAL NEWS ITEMS

O. W. BRUNER, a representative of the Mine and Smelter Supply Co., of Denver, Colo., was a visitor at Nogales, Arizona, last week, looking up trade for his company.

CLARENCE KING, the noted geologist, was examining some mining property in Nevada county, Calif.

H. A. SHIPMAN of Baker City, Oregon, recently left for Boulder, Colorado, on important business.

L. O. COWAN, the mining operator, was in Nogales, Ariz., last week from Cucurpe, Sonora, Mexico.

JOHN MALONEY returned from a trip to some mining property in Sonora, about twenty miles in a westerly direction from Magdalena. He reports that he saw some very promising properties.

MESSRS. TOWNSEND BROS., solicitors of patents, who have for many years done business in the Downey block, corner of Temple and Main streets, Los Angeles, Cal., have removed to the Potomac block, 217 S. Broadway, opposite the City Hall. All the files of the former firm of Hazard & Townsend, the pioneer patent firm of Southern California, will be found at the new address, where larger and more convenient quarters have been secured.

H. R. AVRES, Denver agent for Fraser & Chalmers, has been obliged to leave Colorado on account of ill health. The Fraser & Chalmers office in this city has been closed in consequence, says the *Denver Mining Reporter*.

J. K. HAWK, secretary of the Colorado and California Mineral Developing Co. of Los Angeles, Calif., has just returned home from San Francisco, Calif., where he has been on a combined business and pleasure trip.

DWIGHT FURNESS was in the City of Mexico, Mex., last week, but expected to return to his Guajaluto home soon. He said that the parties who have taken over the Parkman mine at that place are just putting in a twenty-stamp mill, and seem to be doing well. Work on the river recovery scheme above Guanajuato, which is being conducted by parties from St. Charles, Missouri, is suspended till after the rains.

COL. CREWE-READ arrived in Ensenada, Lower California, Mexico, last week from the Trinidad mines in the Jocalitos district. The company's five-stamp mill has just started up in a good body of high grade ore.

L. F. PARSONS, the well-known Los Angeles mining man has just returned from a trip to Randsburg, Kern county, Calif.

PROF. PICKER of Jerseyville, Ill., and MR. C. H. JONES of Springfield, Ill., returned to Florence from Mineral creek, Pinal county, Ariz., last week with MR. W. P. DINEHAM. These Illinois gentlemen expressed themselves as greatly pleased with the outlook on the creek.

N. D. EUSTIS, who recently bought out a half interest in the Last Chance mine, Pinon Mountain, 32 miles N. E. from Mojave, Kern county, reports doing very well. He brings ore to Kane's Springs. It is free milling and runs \$50 in gold to the ton.

SENATOR IVES left Yuma, Ariz., last week for Los Angeles, Cal., on business connected with the big mining suit involving the ownership of a portion of the famous King of Arizona. The case will have come up before Judge Street for trial on the 22nd of September and promises to be an interesting legal contest. Judge C. W. Wright of Tucson will appear for the plaintiff.

JOSEPH POLEN, of the Grand Central Mining Co., came up from La Colorada, Sonora, Mex., for a few days of rest and recreation at Nogales, Ariz.

At a meeting of the Nelson-Poorman Company, at Nelson, British Columbia, the following were elected directors: MESSRS. J. WULFESHON, H. ABBOTT, C. C. BENNETT, G. A. KIRK and H. NEEDHAM. The new officers are J. WULFESHON, president; H. ABBOTT, vice president; C. C. BENNETT, managing director and secretary. A. L. DAVENPORT will continue as superintendent until the directors have secured a successor. The new board will at once carry out a policy of vigorous development and a large force of men will be put to work immediately.

The Dixon Crucible Company of Jersey City, N. J., has published a little pamphlet, "Helps in Brazing." It treats incidentally of brazing graphite, the application of which to bicycle tubes prevents the adherence of the spelter and so effects a saving in labor by making unnecessary the filing which is otherwise needful. The pamphlet, however, especially treats of the process of brazing by the dipping method, or "liquid brazing," as it is called. The brazing crucible is described, together with instruction and caution in regard to its use. Instructions are given how to build and set the necessary furnace, time required for brazing, etc., etc.

OBITUARY.

DAVID EVANS was smothered to death by foul gases in his mine, No. 16, on a pup entering Bonanza at 21 above Dawson City, says the *Yukon Midnight Sun*. He went down the shaft, which is 34 feet deep, but feeling that the air was unsafe he asked his helper to haul him out. He then waited until afternoon before going down again. When he reached the bottom he shouted up that it was all right, but in a few minutes his assistant at the top saw him stagger and grasp the rope. He hoisted away, but when Evans had been raised about six feet he lost his hold and fell back to the bottom. By the time help came he was beyond recovery.

THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

New York, Sept. 17th, 1898.

The following are the Silver, Copper and Lead quotations for the last two weeks

	SILVER	COPPER	LEAD
Sept 5	61 1/2	12 1/2	1 1/2
6	61 1/2	12 1/2	1 1/2
7	61 1/2	12 1/2	1 1/2
8	61 1/2	12 1/2	1 1/2
9	61 1/2	12 1/2	1 1/2
10	61 1/2	12 1/2	1 1/2
11	61 1/2	12 1/2	1 1/2
12	61 1/2	12 1/2	1 1/2
13	61 1/2	12 1/2	1 1/2
14	61 1/2	12 1/2	1 1/2
15	61 1/2	12 1/2	1 1/2

The Silver market has been steady and silver has been absorbed at current rates. Spain is not on the market as a buyer at present, but the East has taken the offerings, without making any effort to put up the price.

COPPER.

There has not been much business doing, but prices remain very firm, and all producers meet with difficulty in executing the orders on hand. Consequently, copper for nearby and October delivery continues to be scarce. Some bids have been received from Europe which could not be executed on account of the high prices asked.

We have to quote Lake copper at 12 1/2 @ 12 3/4; electrolytic copper 11 1/2 @ 12c in cakes, wire bars or ingots, and 11 3/4 @ 11 1/2 for cathodes, with casting copper nominal at 11 3/4 @ 12c.

LEAD

A better tendency has prevailed, with rather a large business doing. Consumers have purchased quite freely, the closing price being very firm at 4c. New York bid. In St. Louis common has been selling at 3.85c, and refined at 4.75 @ 4.90c.

Spanish lead in London is quoted £12 18s, 9d. @ £13, and English Lead 5s. higher.

SPLITER

The large consumptive demand continues, and with the great scarcity of ore smelters have great difficulties in

keeping their plants going. This necessitated a further advance in prices, and we have to quote \$4.65 St. Louis; \$4.80 New York.

ANTIMONY

Antimony continues strong, and we quote Cookson's 9 1/2c; Hallett's, U. S. Star and Japanese, 9 1/2c.

NICKEL

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33 1/2c, and 36c per lb and for smaller orders 35 1/2c, and 38c.

TIN

The consumptive demand has been considerably better and a fairly large business has been done at steady prices, spot being quoted \$16.10 @ 16.15, and futures \$16.12 1/2 @ 16.25.

For the seven months ending July 31st the imports of tin at all the United States ports were 16,873 long tons, an increase of 4,303 tons, or 34.2 per cent over last year.

PLATINUM

Prices are now quoted at \$15 and \$16 per oz., New York. The London quotations are 59 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal, Messrs Elmer & Amend of New York furnish the following quotations: In lots of 250 grams or more, 56c, per gram; in lots of 100 grams or more, 57c, per gram; less than 100 grams, 58c, per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

POTASSIUM CYANIDE

Purified, 98 @ 99 per cent., in cases of 120 lb. at 32c, per lb, in 5, 10, 25 and 50 lb tins at an advance.

QUICKSILVER

New York price is now \$41 per flask. London quotations are unchanged at £7 12s. 6d., second hands \$7 7s. 6d. per flask.

POWDER

F. o. b., San Francisco: No. 1, 70 per cent. nitro-glycerine per lb, in carload lots, 15 1/4c; less than one ton, 17 1/4c. No. 1* 60 per cent., carload lots, 13 1/4c; less than one ton, 15 1/4c. No. 2, 40 per cent., carload lots, 10c; less than one ton, 12c. No. 2*, 35 per cent., carload lots, 9 1/4c; less than one ton, 11 1/4c. No. 2* 30 per cent., carload lots, 9c; less than one ton, 11c. Black

blasting powder in carload lots, minimum car, 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

COKE

There is considerable improvement in the coke situation. Dealers are feeling more cheerful over the outlook, which is much better than at any corresponding period for several years past.

IN CAR LOTS, ST. LOUIS

Connellsville 42 coke 72-hr. Fry \$4.85
New River... \$4.00 Pocahontas 3.90
Crushed... 4.85
Gas works coke, lump, per bushel 10

BORAX

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:
Refined, in carload lots, in barrels, 2 1/2
Refined, in carload lots in sacks, 2 1/2
Powdered, in car lots, 2 1/2
Concentrated, in car lots, 6 1/2

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum
No. 1, 95 per cent. ingots, per lb, 1.20-1.25
No. 2, 90 " " " " 1.10-1.15
Rolled sheets, per lb, 1.00-1.05
Aluminum-Nickel, per lb, 1.00-1.05
Bismuth, per lb, 1.00-1.05
Phosphorus, per lb, 1.00-1.05
Tungsten, per lb, 1.00-1.05
Ferro-tungsten, 60 per cent, 1.00-1.05

Variations in price depend chiefly on the size of the order.

CHEMICALS

There has been an improved demand for nearly all these goods and the imports of bleaching powder especially have been large. Exports of alkali continue fair, and bicarb. soda also shows a good inquiry in this direction. Orders for forward delivery of caustic soda are coming in more freely, especially for domestic high test.

Quotations generally are as follows:

CAUSTIC SODA

Quotations for Caustic soda domestic high test are \$1.40 @ 1.45 per hundred lbs.

ALKALI

Domestic, 58 percent., 50c. @ 55c., foreign 55c. @ 60c. from dock as to style of package.

CARBONATED SODA ASH

58 per cent., 90c and 95c. per 100 lbs. basis 48 per cent.

BI-CARBONATE OF SODA

English, \$2.12 1/2 @ \$2.25 per 100 lb. American, bulk \$1.25 and \$1.50 per 100 lbs. according to brand.

SAL-SODA

For domestic, 50c. per 100 lb., less usual discounts; English, 65c. @ 67 1/2c., Concentrated sal-soda, \$1.60 @ \$1.65 per 100 lbs.

CHLORATE OF POTASH

Chlorate of potash is quoted at \$9.50 and \$9.75 per 100 lbs.

CHLORIDE OF LIME

English prime brands \$1.60 @ \$1.70 American, \$1.70 @ \$1.80; Continental P., \$1.50 @ \$1.60 per 100 lbs.

Acids.

Demand for nitric, muriatic and sulphuric acids continues good, though there has been no large increase in deliveries on large contracts. Prices generally hold firm. Exports from the United States since January 1st this year have grown and for the seven months to July 31st the valuation was \$94,159 against \$60,226 in 1897.

Quotations are per 100 lb from New York and vicinity as follows: Acetic acid, commercial, No. 8, \$1.40 @ \$1.50, muriatic acid, 18°, \$1.10 @ \$1.75; 20°, \$1.20 @ \$1.87 1/2; 22°, \$1.35 @ \$2.25; according to quantity and brand. Nitric acid 36°, \$3.50 @ \$4.75; 38°, \$3.75 @ \$4.62 1/2; 40°, \$4 @ \$4.87 1/2; 42°, \$4.62 1/2 @ \$5.25. Oxalic acid, \$6.50 @ \$6.75. Mixed acids, according to mixture. Sulphuric acid, 66°, \$1.10 for drums and \$1.15 @ \$1.75 for carboys. Chamber acid 50°, in rubbing wry, \$11.50 @ \$12 per ton, a. b. factory. Blue vitriol \$3.50 @ \$3.62 1/2 for extra grades and \$3.37 1/2 for ordinary.

BRIMSTONE

Market is dull and prices practically unchanged. For best unmixed seconds, \$20 @ \$21 a ton is quoted, and \$18.25 @ \$18.50 for thirds. Imports in New York were 1,100 tons and 2,043 tons at Baltimore, all of which will be delivered on old contracts. There was also a receipt at New York of 3,460 tons of iron pyrites from Pilley's Island.

MURIATE OF POTASH

We quote per 100 lbs. on basis of 80 per cent., as follows: New York and Boston, \$1.78 for 80 @ 85 per cent., and \$1.81c. for 95 per cent.; Norfolk and Philadelphia, \$1.76 1/2 for 80 @ 85 per cent., and \$1.79 1/2 for 95 per cent.; Charleston, Savannah, Wilmington, N. C. and New Orleans, \$1.78 1/2 for 80 @ 85 per cent., and \$1.81 1/2 for 95 per cent. All for lots of 50 tons and upward.

BELTING Leather, * Cotton, Rawhide, etc. ALSO Lace Leather

L. P. DEGEN, Manuf'r

Agent for Rubber Belting, Hose and Packing.

105 and 107 Mission Street, San Francisco, Cal.



LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works at the Packer Ranch, Colusa Co. 80 h. p. Hercules Engine, pumping 7200 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas. Gasoline and Oil Engines, 2 to 800 h. p. Send for Catalogue, HERCULES GAS ENGINE WORKS, 210 Bay St., San Francisco.

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Gold Refiners and Assayers.

Highest Cash Prices Paid for Gold and Silver Bullion

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Protect your pipes and boilers with Wm. Berkefeld's Fossil meal composition, packed in sacks, easy to transport anywhere. Send for facts and figures.

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Mark samples plainly, advise by letter of full details, with charges enclosed. Postage on ore one cent per ounce.

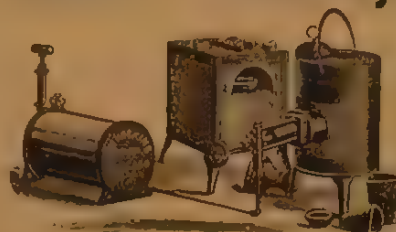
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Blow-Pipe and Assay Furnaces



No dust. No ashes. Cheap, efficient, economical, portable and auto matic. Send for Price-List to

WM. HOSKINS,
81 South Clark St., Room 57
CHICAGO, ILL.

KAINIT.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12 4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, \$8.55 @ \$8.80 for New York and Boston; \$8.90 @ \$9.15 for Norfolk, and Philadelphia; and \$9.05 @ \$9.30 for Charleston, Savannah, Wilmington, N. C., and New Orleans.

NITRATE OF SODA.

Spot nitrate is in ample supply and buyers have the upper hand for the present. We have again to quote a little lower price, \$1.50 @ \$1.55 per 100 lbs. for spot. The same figures are quoted for futures, in view of the quantities known to be afloat for New York.

FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, Sept. 15, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	Sept. 1,	Changes,
Cash	\$ 1,581,353	D. 571,358
Silver	4,130,872	D. 2,117,340
Legal Tender Notes	4,491,812	D. 254,381
Treasury Notes		
Totals	\$9,204,037	\$ 9,575,734

Treasury deposits with national banks amounted to \$65,254,168, an increase of \$2,975,065 during this week.

There has been a steady gain in the cash balance of the Treasury from the proceeds of the new bonds. It is estimated that about \$125,000,000 has been received thus far from these bonds. At present bonds of \$500 or less are only being distributed to subscribers. Notices of allotment are, however, still going out for the larger amounts, but the bonds themselves will not be dispatched until the small bonds have been distributed.

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month	1898	1897	1896
January	67.14	67.79	67.79
February	67.22	67.79	67.79
March	67.07	67.79	67.79
April	67.10	67.79	67.79
May	67.06	67.79	67.79
June	67.11	67.79	67.79
July	67.08	67.79	67.79
August	67.14	67.79	67.79
September	67.11	67.79	67.79
October	67.11	67.79	67.79
November	67.11	67.79	67.79
December	67.11	67.79	67.79
Year	67.79	67.79	67.79

Average Prices of Metals per lb. in New York.

Month	Copper	Tin	Lead	Spelter
January	10.09	13.87	3.65	3.95
February	10.11	14.08	3.71	4.04
March	11.05	14.38	3.72	4.25
April	12.14	14.50	3.64	4.27
May	12.00	14.53	3.64	4.27
June	11.85	15.22	3.59	4.27
July	11.93	15.60	3.95	4.66
August	11.89	16.23	4.00	4.58
September				
October				
November				
December				

Gold and Silver Exports and Imports.

At all United States ports, June, 1898, and years from January 1st, 1898 and 1897

	Coin and Bullion Exp.	Imp.	In Ores Exp.	Imp.
Gold—				
June	\$ 375,529	\$ 1,184,774	\$ 1,184,774	\$ 1,184,774
1898	6,048,670	90,214,751	72,141	2,839,041
1897	21,000,717	3,715,840	93,188	2,220,111
Silver—				
June	4,156,640	799,735	1,129,049	1,129,049
1898	24,302,928	3,772,116	1,129,049	9,176,721
1897	27,804,970	4,419,890	259,150	10,600,481

This statement includes the exports and imports at all United States ports the figures being furnished by the Bureau of Statistics of the Treasury Department

Exports of specie from San Francisco for the month of July were as follows:

	To Hong Kong	To Honolulu	To Central America	To Mexico	To New York
Totals	\$2,257,688	\$1,713,176	\$3,070,944	\$1,187,187,140	\$1,336,809

The silver included \$365,088 in bars, \$1,534,218 in Mexican dollars, \$8,500 in Peruvian sols, and \$6,500 in United States coin. Of the gold \$2,253,638 was in coin and \$4,000 in bullion. All the gold bullion went to New York.

Imports of specie at San Francisco by water for the seven months ending July 31st were as follows:

	Coin	Bullion.	Total.
Gold	\$14,559,947	\$1,877,145	\$16,436,092
Silver	136,533	741,661	\$81,194
Totals	\$14,696,480	\$2,618,806	\$17,315,286

The sources of the imports this year were Australia, \$13,461,866; Japan, \$2,199,447; Hawaiian Islands, \$112,092; Central America, \$13,888; Mexico, \$1,356,942; British Columbia, \$147,637; miscellaneous, \$2,614. The large increase this year was chiefly in gold from Australia.

Exports of Specie from San Francisco in August included \$611,463 in silver and \$4,769,063 in gold. For the eight months ending August 31st the shipments were as follows:

	Gold	Silver	Totals
Hong Kong	\$3,011	\$4,209,643	\$4,212,654
Shanghai		466,578	466,578
Taipei		1,100	1,100
India		415,000	415,000
Tahiti	2,411	28,000	30,411
Honolulu	395,000	28,000	423,000
Central America	27,435	103,947	131,382
Mexico	700		700

Total foreign, \$ 15,347,347

New York, \$5,347,781

Totals, \$20,695,128

Totals, 1897, \$17,874,821

Totals, 1897, \$17,874,821

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MINING STOCK MARKETS.

New York, Sept. 20, 1898.

For the fiscal year ending June 1st, 1898, the receipts of the Homestake Company of South Dakota, from various sources, aggregated \$2,543,362, and the expenditures \$1,864,734, leaving a profit of \$678,628. Dividends paid during this period amounted to \$500,000. Dendwood Terra has yielded nothing during July and August, as it has not been working. Offers are made for this stock at 35c., but no transactions are reported.

Horn Silver of Utah, holds around \$1.25 bid, against \$1.40 asked. The upward tendency of the silver market is advantageous to Ontario, for should silver continue above 60c. this property can resume active operations. At present the stock is featureless at \$3.25.

A report has been current in Boston for several days, and appears today as a press dispatch from Butte, Montana, to the effect that negotiations are in progress for the consolidation of the Anaconda, the Boston & Montana and the Montana Ore Purchasing Company. We are informed on the best authority that there is nothing whatever in this rumor.

COLORADO SPRINGS, Sept. 24, 1898.

The market last week was a sellers' affair, with buyers ready to take everything offered. Some few stocks held their own and showed good strength, but the general list took a toboggan picnic. Pharmacist was the leader in the drop, starting at 9% and closing at 8, with 125,000 shares sold Sept. 21st. Anaconda was the leader in the other direction, and in jumping from 70 to 75, shook out 9,000 shares Sept. 21st. A fluctuating market may be looked for.

Argentine Junata is selling at 24 1/2c. Elkton Consolidated demands \$1.21. Moon Anchor is also up to \$1.16. Partland is making a record for herself and selling at \$1.45. Anaconda records 10,200 shares sold Sept. 22, at still an advanced price having obtained 80c. per share. Union is showing up well. On September 22 there were 20,500 shares sold at 19 1/2 cents per share.

Of the unlisted stocks, Gold Coin heads the list by selling at \$1.47, with Anchorin Leland following at 82 cents.

SALT LAKE CITY, Utah, Sept. 20, 1898.

Ajax holds well on its recent advance, and the reported encountering of a new body of copper ore assisted in sustaining the price. The report of the shipping of higher grade ore than is customary has caused Anchor to advance sharply. Bullion-Deck slumped. Continental-Eureka was unchanged.

Dalton has levied assessment No. 13 of 1/2 cent per share, payable September 28. Dalton & Lark was dull and inactive. Daly and Daly West maintained last week's figures. Dexter's advance was fairly held. Four Aces was unchanged. Galena slumped heavily, due doubtless to the poor showing in the mine. Geyer-Marion's dividend of \$6000 was paid on the 1st. Reports of mine and mill conditions are favorable.

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WANTED by a young man, a position as Assayer etc.; experienced competent and has a good knowledge of all metallurgical operations. Good references. Address, T. K. JONES, OFFICE.

WANTED—Situation by Millman and As. Wages reasonable. Good references. Address "H."

EXPERIENCED Assayer and Cyanide operator desires engagement. The successful and economical treatment of slurry ore or tailings by cyanide a specialty. Address W. V. WATTS, Fly, White Pine Co., Nev.

AN EDUCATED Chemist and Millman thoroughly understands Mining, Chlorination and Cyanide Processes. Twelve years experience in Montana and Colorado now open to an engagement. Moderate salary. Address Chemist for sale, OFFICE, Los Angeles, Cal.

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MINING MAN of experience will develop Gold property of merit for 1/2 interest, or will bond whole mine and develop. Correspondence with owners only. Give full particulars. Will give satisfactory references. Address P. O. Box 58, Los Angeles, Cal.

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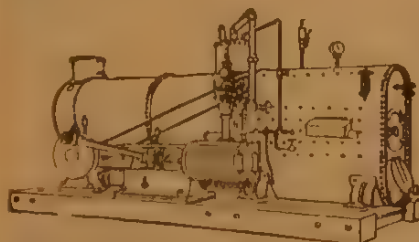
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A FINE Copper property in Mexico. A one-half interest in a good producing copper property will be given for required capital to do the necessary development work and placing machinery thereon. Substantial guarantee. Address "MINE," 1012 Mission St., San Francisco, Cal.

A VERY valuable, extensive Lead Mining Property in Southwest Virginia. Shafts sunk over 20 feet and actual work has demonstrated richness of veins and purity of ore. Address, GEORGE FRANK.

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Mining Engineer and Metallurgist

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The Graphite

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Mines Examined and

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COLON, CALIFORNIA

Iron Clad	02½ Wheel of Fortune	002%
Jack Pot	02½ Work	02%

MEXICO		
Name of Company	State	Price
Alazara.....	Hidalgo.....	5
Amistad y Concordia.....	".....	24
Angustias.....	Guauajuato.....	390
Arcvalo y Anexas.....	Hidalgo.....	240
Auroriana y Anexas.....	Zacatecas.....	170
Barridos y Cabria.....	Durango.....	100
Ritotolome de Medina.....	Hidalgo.....	150
Cabrera y An.....	Zacatecas.....	150
Candelaria de Pinos.....	".....	160
Capiraya.....	Durango.....	120
Carmen.....	Hidalgo.....	400
Castellana y San Ram.....	Tepe.....	25
Cerro Colorado.....	Chihuahua.....	10
Cinco Senores y An.....	Guauajuato.....	680
Concepcion y Anexas.....	B. Luis Potosi.....	10
El Oro.....	Guauajuato.....	40
Rapamaza y An.....	Mexico.....	1 300
Guadalupe.....	Guauajuato.....	180
Huautla.....	Santa Ana.....	160
Luz de Borda.....	Michoacan.....	40
Luz de Maravillas.....	Hidalgo.....	100
Pabellon.....	".....	150
Palma.....	Zacatecas.....	100
Puritas de los Com.....	".....	5
Real del Monte.....	Hidalgo.....	800
San Jucio y Va.....	".....	25
Re-tauradora.....	Durango.....	50
San Francisco.....	Hidalgo.....	170
S. Pad. Chaichihuites.....	".....	22
San Rafael y Anexas.....	".....	925
do, Free Store.....	".....	40
San Rafael del Oro.....	Hidalgo.....	120
Sta. Maria de la Paz.....	S. Luis Potosi.....	850
Sirena.....	Durango.....	50
Soledad.....	Hidalgo.....	500
Sorpresa.....	".....	250
Trinidon.....	Guauajuato.....	40
Trinidango.....	Puebla.....	27
Union.....	Hidalgo.....	250
Zamelahuacan (gold).....	Veracruz.....	100
Zona Min. de Pozos.....	Guauajuato.....	15

NOTE—The above Mexican stocks are figured on the basis of Mexican silver.

INCORPORATED MINES PAYING DIVIDENDS.

1	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
1	Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	July 1898	\$ 110,000	G.
2	Alaska, Treadwell	Alaska	200,000	5,000,000	25	37 1/2	April 1898	3,175,000	G.
3	Alaska Mexican	Alaska	200,000	1,000,000	5	10	April 1898	297,031	G.
4	Alice	Montana	400,000	10,000,000	25	05	April 1898	1,075,000	G. S.
5	Alice	Utah	400,000	10,000,000	25	05	April 1898	1,075,000	S. L. G.
6	Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1898	6,750,000	C.
7	Anchoria Leland	Colorado	600,000	600,000	1	01	July 1898	111,000	G.
8	American Gold	Colorado	800,000	3,000,000	10	02	Mar 1898	291,000	G. S. L.
9	Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1898	780,000	S.
10	Bald Butte	Montana	250,000	250,000	1	08	Sept 1897	512,500	G. C. S.
11	Bangkok C-Bell	Colorado	600,000	600,000	1	01	July 1898	107,510	S. L. C.
12	Big Six	Colorado	500,000	500,000	1	00 1/2	May 1898	15,000	G. S.
13	Boston & Montana	Montana	150,000	3,750,000	25	3 00	May 1898	7,625,000	G. C. S.
14	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Aug 1898	2,515,000	G. S.
15	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	05	July 1898	495,000	S. L.
16	Cariboo	British Col.	600,000	600,000	1	02	May 1898	291,965	G.
17	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	June 1898	53,850,000	C.
18	Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
19	Central Lead	Missouri	4,000	400,000	100	1 00	Apr 1898	40,000	L.
20	Champion	California	34,000	340,000	10	25	April 1898	296,200	G.
21	Chloride Point	Utah	500,000	500,000	1	01	Dec. 1897	5,000	G. S.
22	Colorado Sun	Montana	100,000	1,000,000	10	50	June 1898	1,595,000	G. S. C.
23	Crescent	Utah	24,000	600,000	25		July 1897	280,000	
24	Crowned King	Arizona	600,000	6,000,000	10	02	June 1898	100,000	G. S. L.
25	Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S. L.
26	Deadwood Terra	S. Dakota	200,000	5,000,000	25	05	May 1898	1,340,000	G.
27	De Lamar	Idaho	400,000	2,000,000	5	20	May 1898	2,451,000	S. L.
28	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01 1/2	July 1898	555,710	G. S.
29	El Paso	Colorado	650,000	650,000	1	01	Jan 1899	12,093	G. S.
30	Empire State	Idaho	75,000	750,000	10	10	June 1898	7,500	
31	Fern	British Col.	200,000	200,000	1	05	Jan 1898	10,100	
32	Florence	Montana	500,000	2,500,000	5	01	May 1897	132,530	S.
33	Geyser-Marion	Utah	300,000	1,500,000	5	02	Sept 1898	96,000	G.
34	Gold Coin of Victor	Colorado	1,000,000	1,000,000	1	01	June 1898	80,000	G.
35	Golden Cycle	Colorado	23,000	1,000,000	5	00 1/2	June 1898	150,000	
36	Gold Coin	Colorado	200,000	1,000,000	5	05	Nov 1897	190,000	G. S.
37	Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,825	G.
38	Golden Reward	S. Dakota		1,000,000		15	Feb 1894	155,000	G.
39	Grand Central	Utah	250,000	250,000	1	12 1/2	Aug 1898	93,750	G. S. C. L.
40	Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S. G. L. C.
41	Helena & Franco	Idaho	500,000	2,500,000	5	04	August 1898	475,000	S. L.
42	Highland	S. Dakota	100,000	10,000,000	100	20	June 1898	3,664,718	G.
43	Holy Terror	S. Dakota	300,000	300,000	1	03	July 1898	99,000	G.
44	Homestake	S. Dakota	125,000	12,500,000	100	50	June 1898	6,806,250	G.
45	Hope	Montana	100,000	1,000,000	10	10	Mar 1898	762,252	S.
46	Horn Silver	Utah	400,000	10,000,000	25	05	June 1898	5,100,000	S. L.
47	Idaho	British Col.	500,000	500,000	1	05	May 1898	261,000	
48	Iowa	Colorado	1,000,000	1,000,000	1	00 1/2	June 1898	90,000	G.
49	Iron Mountain	Montana	500,000	5,000,000	10	1 00	Jan 1898	501,100	S.
50	Isabella	Colorado	2,250,000	2,250,000	1	00 1/2	June 1897	270,000	G.
51	Kearnsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
52	Last Chance	British Col.	500,000	500,000	1	04	Jan 1897	12,000	S. L.
53	Le Roi	British Col.	500,000	2,500,000	5	10	Apr 1898	775,000	G.
54	Lille	Colorado	1,000,000	1,000,000	1	01	July 1898	99,100	G.
55	Minnesota	Minnesota	165,000	16,500,000	100	1 50	July 1898	3,735,000	L.
56	Montana Ltd	Montana	650,000	3,300,000	5	05 1/2	May 1898	2,997,557	G. S.
57	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	July 1898	780,000	
58	Morning Star	California	240,000	240,000	100	5 00	June 1898	686,600	G.
59	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898	60,000	G.
60	Mercur	Utah	200,000	5,000,000	25	12 1/2	Aug 1898	1,141,000	G.
61	Mammoth	Utah	400,000	10,000,000	25	05	Sept 1898	1,310,000	G. S. C. L.
62	Moon Anchor Gold	Colorado	600,000	600,000	1	07 1/2	July 1898	216,000	G.
63	New Elkhorn	Colorado	300,000	1,500,000	5	24	Sep. 1898	72,000	G.
64	New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	July 1898	930,000	S. G.
65	Napa	California	100,000	700,000	7	20	July 1898	930,000	G.
66	New Idria Quicksilver	California	100,000	500,000	5	10	July 1898	60,000	G.
67	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S. L.
68	Oreola	Michigan	50,000	1,250,000	25	1 00	June 1898	2,272,500	C.
69	Parrot	Montana	230,000	2,300,000	10	30	July 1898	2,000,898	C.
70	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	June 1898	38,775	
71	Portland	Colorado	3,000,000	3,000,000	1	01 1/2	June 1898	1,492,898	G. S.
72	Princess	Colorado	1,000,000	1,000,000	1	00 1/2	Feb 1897	46,000	G.
73	Quincy	Idaho	100,000	2,600,000	25	3 00	Feb. 1898	9,370,000	C.
74	Rambler-Cariboo	British Col.	1,000,000	1,000,000	1	02	April 1897	40,000	
75	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898	20,000	G.
76	Reco	British Col.	1,000,000	1,000,000	1	10	Jan 1898	287,500	S. L.
77	Sacramento	Utah	1,000,000	5,000,000	5	00 1/2	July 1898	47,000	G.
78	Santa Rosalia	California	100,000	100,000	1	10	Feb. 1898	125,000	G. S.
79	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S.
80	South Swansea	Utah	150,000	150,000	1	05	Aug 1898	105,000	S. L.
81	Standard	California	200,000	20,000,000	100	10	Mar 1898	5,654,940	G. S.
82	St. Joseph	Missouri	250,000	2,500,000	10	15	Oct 1897	24,000	L.
83	Silver King	Utah	150,000	3,000,000	20	25	Aug 1898	1,650,000	S. L. G.
84	Slocan Star	British Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	
85	Smuggler	Colorado	1,000,000	1,000,000	1	01	June 1898	1,035,000	S. L. Z.
86	Smuggler Union	Colorado	50,000	5,000,000	100	1 00	Oct 1898	150,000	G. S.
87	Swansea	Utah	100,000	500,000	5	05	Aug 1898	111,500	S. L.
88	Tom Boy	Colorado	200,000	2,000,000	10	10	Dec 1898	600,000	G.
89	Tamarack	Michigan	80,000	1,500,000	15	3 00	June 1898	5,330,000	C.
90	Union	Colorado	1,250,000	1,250,000	1	01	June 1898	73,000	S.
91	Utah	Utah	100,000	1,000,000	10	01	Dec. 1897	177,000	G. S.
92	Utah Consolidated	Utah	30,000	150,000	5	02	Sept. 1898	3,010	S. L.
93	Victor	Colorado	200,000	1,000,000	5	50	June 1898	955,000	G.
94	Vindicator	Colorado	1,500,000	1,500,000	1	05	July 1898	76,125	G.
95	Western Mine Enterprise	Montana	500,000	500,000	1	20	Jan 1898	48,880	
96	War Eagle	British Col.	500,000	500,000	1	01 1/2	July 1898	264,740	
97	White Water	British Col.	125,000	625,000	5	32	April 1898	104,000	

S, Silver.

G, Gold.

L, Lead.

C, Copper.

Q, Quicksilver.

I, Iron.

Z, Zinc.

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"Well," said he, "I've used this pump for twenty years, and it's better than most pumps yet."

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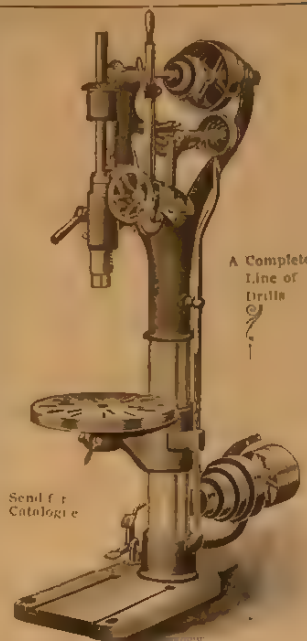
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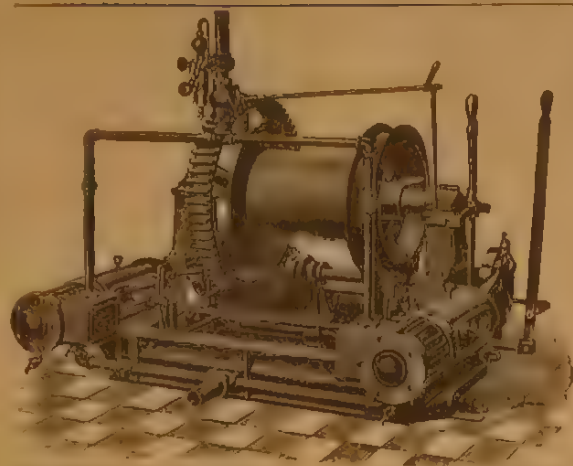
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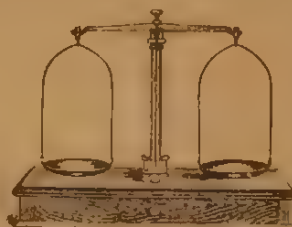
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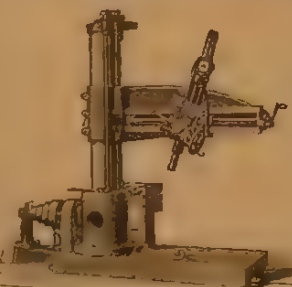
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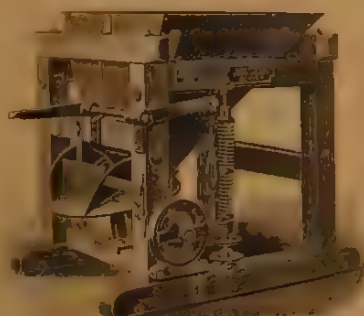
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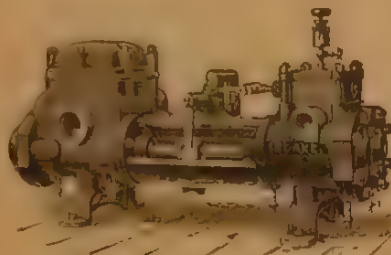
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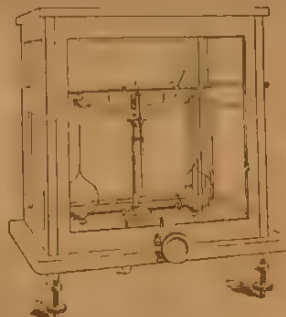
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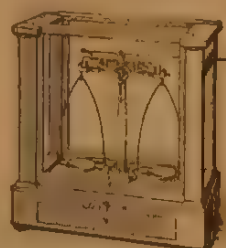
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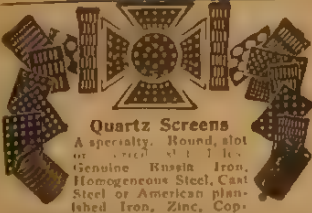
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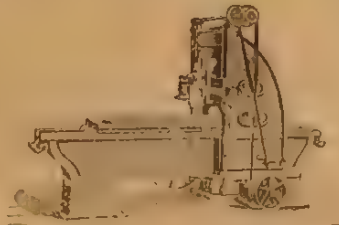
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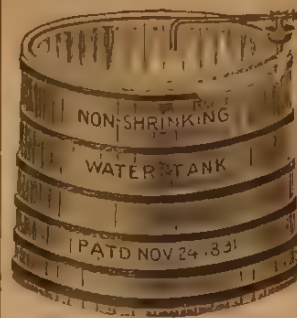
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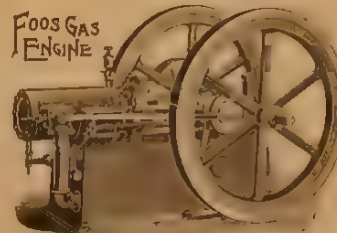
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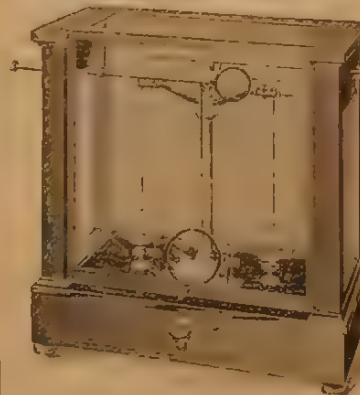
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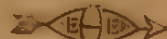
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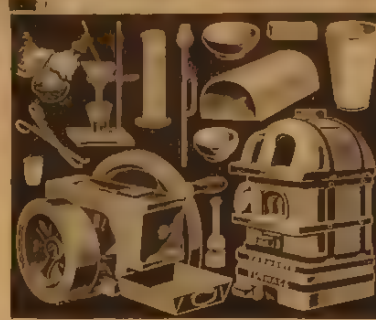
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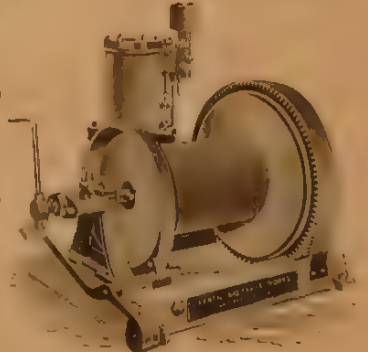
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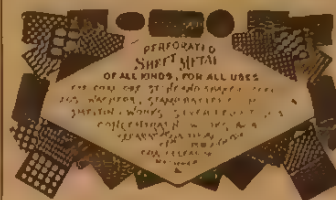
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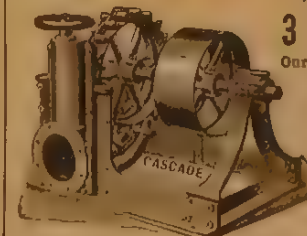
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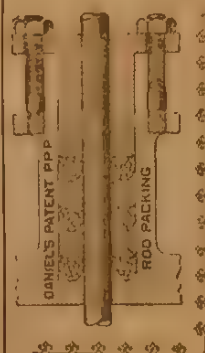
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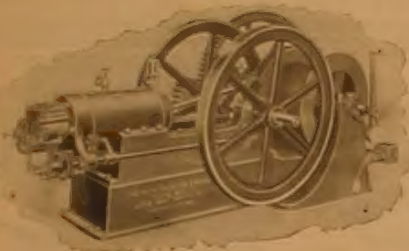
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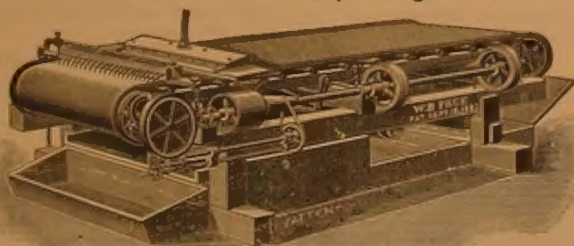
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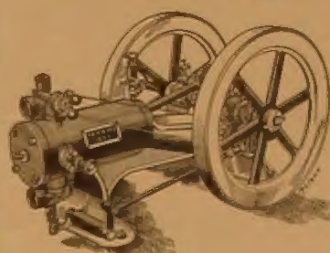
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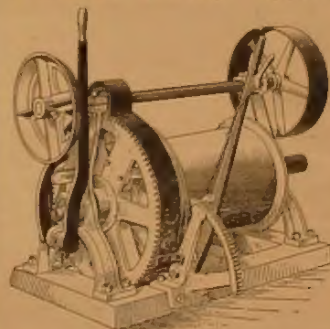
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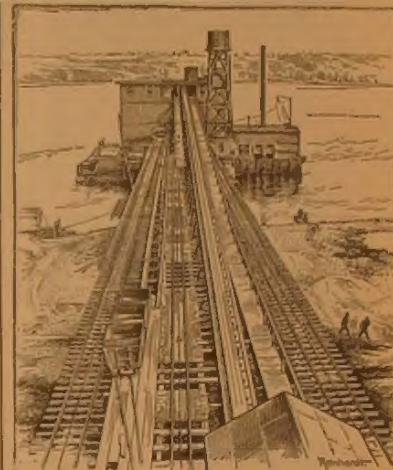
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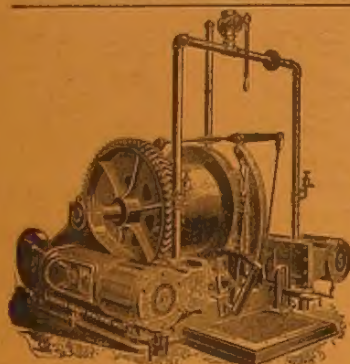
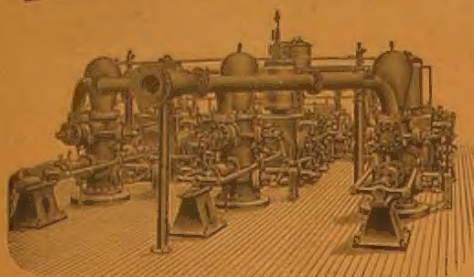
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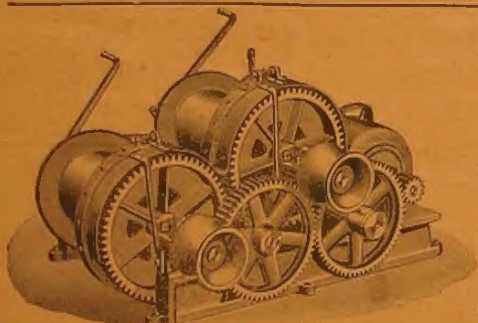
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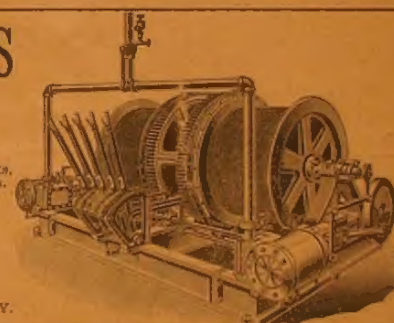
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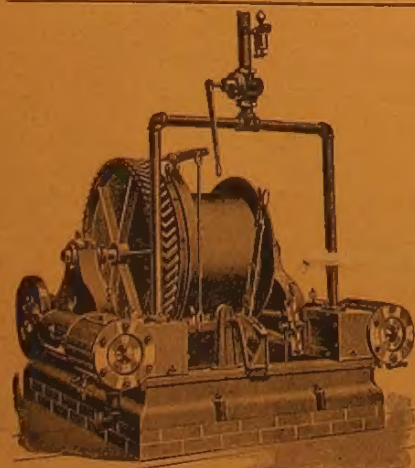
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